APPENDIX C
APPLICABLE REGULATIONS, LAWS, AND AGREEMENTS

C APPLICABLE REGULATIONS, LAWS, AND AGREEMENTS

The Atomic Energy Act of 1954 (AEA) authorizes states to establish programs to assume U.S. Nuclear Regulatory Commission (NRC) regulatory authority for certain activities. For example, in accordance with Section 274 of the AEA, as amended, beginning on August 31, 1999, the State of Ohio assumed regulatory responsibility over the following:

- byproduct materials as defined in Section 11e.(1) of the Act,
- byproduct materials as defined in Section 11e.(2) of the Act,
- source materials,
- special nuclear materials in quantities not sufficient to form a critical mass,
- the regulation of the land disposal of byproduct, source, or special nuclear waste materials received from other persons, and
- the evaluation of radiation safety information on sealed sources or devices containing byproduct, source, or special nuclear materials and the registration of the sealed sources or devices for distribution, as provided for in regulations or orders of the NRC.

The Ohio Agreement State Program is administered by the Bureau of Radiation Protection in the Ohio Department of Health.

In addition to implementing some Federal programs, state legislatures develop their own laws. State statutes supplement as well as implement Federal laws for protection of air, water quality, and groundwater. State legislation may address Solid Waste Management Programs, locally rare or endangered species, and historic and cultural resources.

In addition, the Clean Water Act (CWA) allows for primary enforcement and administration through state agencies, provided the state program is at least as stringent as the Federal program and conforms to the CWA and delegation of authority for the Federal National Pollutant Discharge Elimination System (NPDES) Program from the Environmental Protection Agency (EPA) to the state. The primary mechanism to control water pollution is the requirement that direct dischargers to obtain an NPDES permit or in the case of states where the authority has been delegated from the EPA, a State Pollutant Discharge Elimination System (SPDES) permit, pursuant to the CWA.

One important difference between Federal regulations and certain state regulations is the definition of waters regulated by the state. Certain state regulations may include underground waters while the CWA only regulates surface waters.

C.1 Federal &State Environmental Requirements

Certain environmental requirements, including some discussed earlier, may have been delegated to state authorities for implementation, enforcement, or oversight. Table C-1 provides a list of representative state environmental requirements that may affect license renewal applications (LRAs) for nuclear power plants.

Table C-1. Federal and State Environmental Requirements

Davis-Besse Nuclear Power Station, Unit No. 1 (Davis-Besse) is subject to numerous state requirements regarding their environmental program. Those requirements are briefly described below.

Agency	Law/Regulation	Requirements
NRC	Title 10 of the *Code of Federal Regulations* (CFR) Part 51	"Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." This part contains environmental protection regulations applicable to the NRC's domestic licensing and related regulatory functions.
NRC	10 CFR Part 54	"Requirements for Renewal of Operating Licenses for Nuclear Power Plants." This part focuses on managing adverse effects of aging rather than identification of all aging mechanisms. The rule is intended to ensure that important systems, structures, and components (SSCs) will continue to perform their intended function in the period of extended operation.
NRC	10 CFR Part 50	Regulations promulgated by the NRC pursuant to the Atomic Energy Act of 1954, as amended (68 Stat. 919), and Title II of the Energy Reorganization Act of 1974 (88 Stat. 1242), to provide for the licensing of production and utilization facilities. This part also gives notice to all persons who knowingly provide to any licensee, applicant, contractor, or subcontractor, components, equipment, materials, or other goods or services, that relate to a licensee's or applicant's activities subject to this part, that they may be individually subject to NRC enforcement action for violation of § 50.5.
Air quality protection		
Ohio EPA, Division of Air Pollution Control	Ambient Air Quality & Emergency Episode Standards Ohio Administrative Code Chapter 3745-25	Primary ambient air quality standards define levels of air quality, which are necessary, with an adequate margin of safety, to protect the public health. Secondary ambient air quality standards define levels of air quality, which are necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
Ohio EPA, Division of Air Pollution Control	Permits to Install New Sources of Pollution Ohio Administrative Code Chapter 3745-31	This chapter provides requirements for installation, modification, and operation of new and existing air contaminant sources at facilities that are not subject to Chapter 3745-77 of the Administrative Code. This chapter also provides requirements for installation and modification of air contaminant sources at facilities that are, or will be, subject to Chapter 3745-77 of the Administrative Code.
EPA	Clean Air Act (CAA) (42 U.S.C. § 7401 et seq.)	The Clean Air Act (CAA) is the law that defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The CAA requires EPA to set National ambient air quality standards for six common air pollutants—particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead.
Coastal zone protection		
U.S. Department of Commerce	Coastal Zone Management Act of 1972 (16 U.S.C. § 1451-1464)	The Congress finds and declares that it is the National policy to do the following: • to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and

Agency	Law/Regulation	Requirements
		succeeding generations and • to encourage and assist the states to effectively exercise their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as the needs for compatible economic development.
Ohio Department of Natural Resources—Office of Coastal Zone Management	Ohio Coastal Management Program Ohio Administrative Code Chapter 1506	In an effort to balance diverse economic and environmental interests, the Ohio Coastal Management Program sets forth the guidelines for use of Ohio's coastal resources to ensure their continued benefit for this and future generations.
Water resources protection		
EPA	Clean Water Act (CWA) (33 U.S.C. § 1251 et seq.)	The NPDES permit is required for plant industrial, sanitary, and storm water discharges to waters of the state. The NPDES permit requires the compliance of each point source with authorized discharge levels, monitoring requirements, and other appropriate requirements.
EPA	Section 401 of the CWA (33 U.S.C. § 1341)	Section 401 Water Quality Certification of the CWA requires a Section 401 water quality certification and payment of applicable fees before the issuance of a Federal permit or license to conduct any activity that may result in any discharge to waters of the state.
EPA	Section 404 of the CWA (33 U.S.C. § 1344)	Section 404 of the CWA established a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. The U.S. Army Corps of Engineers (USACE) and the EPA jointly administer this program. Under the 404 Program, no discharge of dredged or fill material is allowed if a practicable alternative exists that is less damaging to the aquatic environment or if the Nation's waters would be significantly degraded. A Federal permit is required to discharge dredged or fill material into wetlands and waters of the U.S.
EPA	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. § 9601 et seq.)	Section 101 of CERCLA requires a permit to cover consumptive water use over 20,000 gallons per day (over a 30-day average) of surface and ground water.
EPA	Wild and Scenic River Act (16 U.S.C. §1271 et seq.)	This act created the national wild and scenic rivers system, established to protect the environmental values of free flowing streams from degradation by impacting activities including water resources projects.
EPA	Floodplain Executive Order (No. 11988. May 24, 1977, 42 *Federal Register* (FR) 26951) and Wetlands Executive Order (No. 11990. May 24, 1977, 42 FR 26961)	Both Executive Orders require Federal agencies to consider the impacts of their actions on floodplains and wetlands through existing review procedures such as the National Environmental Policy Act of 1969 (NEPA).
Waste Management & Pollution Prevention		
EPA	Resource Conservation and Recovery Act (RCRA) (42 U.S.C. § 6901 et seq.)	Before a material can be classified as a hazardous waste, it must first be a solid waste as defined under the RCRA. Hazardous waste is classified under Subtitle C of the RCRA. All applicable generators of hazardous waste regulations are contained in

Agency	Law/Regulation	Requirements
		40 CFR Parts 261 and 262. Parts 261.5(a) and 261.5(e) contain requirements for conditionally-exempt small-quantity generators (CESQGs). Part 262.34(d) contains requirements for small-quantity generators (SQGs). Parts 262 and 261.5(e) contain requirements for large-quantity generators (LQGs).
EPA	Pollution Prevention Act (42 U.S.C. § 13101 et seq.)	This act formally established a National policy to prevent or reduce pollution at its source whenever feasible. It provides funds for state and local pollution prevention programs through a grant program to promote the use of pollution prevention techniques by business.
Emergency planning & response		
Ohio EPA, Division of Air Pollution Control	Risk Management Program Ohio Administrative Code Chapter 3745-104	The intent of section 112(r) of the CAA is to prevent accidental releases to the air and mitigate the consequences of releases that do occur by focusing on prevention measures on chemicals that pose the greatest risk to the public and the environment. Under these requirements, industry has an obligation to prevent accidents and operate safely.
Ohio EPA, Division of Air Pollution Control	Emergency Planning and Preparedness Ohio Administrative Code Chapter 1301:7-7-04	The Emergency Planning and Community Right-to-Know Act (EPCRA) was passed by Congress in 1986. EPCRA was included as Title III of the Superfund Amendments and Reauthorization Act (SARA) and is sometimes referred to as SARA Title III. EPCRA provides for the collection and availability of information regarding the use, storage, production, and release of hazardous chemicals to the public and emergency responders in your communities. The law promotes a working relationship among Government at all levels, business and community leaders, environmental and other public interest organizations, and individual citizens to improve hazard communications and emergency planning.
Ohio EPA, Division of Air Pollution Control	Toxic Release Inventory Rules Ohio Administrative Code Chapter 3745-100	These rules establish reporting requirements and schedules for each toxic chemical known to be manufactured (including imported), processed, or otherwise used in excess of an applicable threshold quantity. It applies only to facilities of a certain classification.
Biotic resources protection		
U.S. Fish & Wildlife Services (FWS)	Endangered Species Act (ESA) (16 U.S.C. § 1531 et seq.)	This act forbids any Government agency, corporation, or citizen from taking (harming or killing) endangered animals without an Endangered Species Permit.
FWS	Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.)	To minimize adverse impacts of proposed actions on fish and wildlife resources and habitat, this act requires that Federal agencies consult Government agencies regarding activities that affect, control, or modify waters of any stream or bodies of water. It also requires that justifiable means and measures be used in modifying plans to protect fish and wildlife in these waters.
Ohio EPA, Division of Surface Water—Isolated Wetland Permitting	General and individual Isolated wetland permits Ohio Administrative Code Chapter 6111.021	A person that proposes to engage in an activity that involves the filling of an isolated wetland shall apply to the director for coverage under a general state-isolated wetland permit or shall apply for an individual state-isolated wetland permit. No person shall engage in the filling of an isolated wetland unless authorized to do so by a general or individual state-isolated wetland permit.
Cultural resources protection		
Advisory Council on Historic Preservation	National Historic Preservation Act (NHPA)	This act directs Federal agencies to consider the impact of their actions on historic properties. The NHPA also encourages state

Agency	Law/Regulation	Requirements
(ACHP)	(16 U.S.C. § 470 et seq.)	and local preservation societies.
Ohio Historic Preservation Office Ohio Historical Society	Historical Society Ohio Administrative Code Chapter 149-1-02	These are guidelines for archaeological investigations on public land, archaeological preserves, and sites listed in the state registry of archaeological landmarks.

C.2 Operating Permits and Other Requirements

Several operating permit applications may be prepared and submitted, and regulatory approval or permits or both would be received prior to license renewal approval by the NRC. Table C-2 lists representative Federal, state, and local permits.

Table C-2. Federal, State, and Local Permits and Other Requirements

Davis-Besse is subject to other requirements regarding various aspects of their environmental program. Those requirements are briefly described below.

License, Permit, or Other Required Approval	Responsible Agency	Authority	Relevance & Status
License to operate	NRC	AEA (42 U.S.C. 2011, et seq.) 10 CFR 50.10	Operation of Davis-Besse Permit Number: NPF-3 Issued: 04/22/1977 Expires: 04/22/2017
Storage of spent nuclear fuel & high-level radioactive waste	NRC	10 CFR Part 72	Use of Radioactive waste cask Certificate Number: 1004 Issued: 01/23/1995 Expired: 01/31/2015
Air quality protection			
Permit to operate an air containment source	Ohio EPA, Division of Air Pollution Control	CAA, 40 U.S.C. 1857 et seq.; Ohio Air Pollution Control Act (Ohio Administrative Code Chapter 3745-31)	Operation of station auxiliary boiler Permit Application No. 0362000091B001 Issued: Annual Reporting Expires: Indefinite
Water resources protection			
NPDES	Ohio EPA, Division of Surface Water	CWA (33 U.S.C. 1251 et seq.); 40 CFR Part 122 Ohio Water Pollution Control Act (Ohio Revised Code 6111)	Construction of Switchyard project and control-discharge of storm water in Ottawa County, Carrol Township Ohio Permit No. 2GC02563*AG Issued: 12/21/2009 Expires: Upon Project Completion
NPDES	Ohio EPA, Division of Surface Water	CWA (33 U.S.C. 1251 et seq.); 40 CFR Part 122 Ohio Water Pollution Control Act (Ohio Revised Code 6111)	Treatment of wastewater and effluent discharge to surface receiving waters (Toussaint River and Lake Erie) Ohio Permit No. 21B00011*ID

License, Permit, or Other Required Approval	Responsible Agency	Authority	Relevance & Status
			Issued: 09/01/2006 Expires: 04/30/2011 (every 5 years)
Water withdrawal and use registration and file annual report	Ohio Department of Natural Resources, Division of Water Resources	Ohio Revised Code Section 1521.16	Withdrawal and use of more than 100,000 gallons of water daily from all sources Registration # 00598 Issued: 01/01/1990 Expires: Indefinite
Waste management and pollution prevention			
Notification of regulated waste activity	EPA	RCRA, as amended (42 U.S.C. s/s 321 et seq. (1976)	Generation and accumulation of hazardous waste EPA ID# OHD000720508 Issued: --- Expires: Indefinite
Report of regulated waste activity	Ohio EPA, Division of Hazardous Waste Management	Ohio Administrative Code Chapter 3745-52-41	Generation. Accumulation and offsite disposal of hazardous waste EPA ID# OHD000720508 Issued: Annual Reporting Expires: Indefinite
Emergency planning and response			
Hazardous material registration	U.S. Department of Transportation	Hazardous Materials Transportation Act (HMTA) (49 U.S.C. 1501 et seq.); AEA, as amended (42 U.S.C. 2011 et seq.); 49 CFR Parts 107 Subpart G, 172, 173, 174, 177, and 397	Transportation of hazardous materials Permit Number: 042009 450 002RT Issued: 05/19/2009 Expires: 06/30/2012 (Renewed Triennially)
License to deliver radioactive waste	Tennessee Department of Environment and Conservation	Tennessee Code Annotated 68-202-206	Shipment of radioactive material to a licensed disposal-processing facility within the State of Tennessee Tennessee Delivery License # T-OH003-LO9 Issued: Annually Expires: 12/31/2010
Underground storage tank registration	Ohio Department of Commerce, Division of State Fire Marshal	Ohio Administrative Code 1301: 7-9-04	Registration of underground diesel storage tanks T00001, T00002, and T00003 Certificate # 62000072 Issued: Annually Expires: 06/30/2011

License, Permit, or Other Required Approval	Responsible Agency	Authority	Relevance & Status
Human health			
X-ray generating equipment registration	Ohio Department of Health	Ohio Administrative Code 3701:1-38-03(C); Ohio Revised Code 3748.06 and 3748.07	Operation of X-ray generation Equipment Registration # 17-M-07181-005 Issued: Biennially Expires: 05/31/2012
Biotic resource protection			
Scientific Collection Permit	Ohio Department of Natural Resources, Division of Wildlife	Ohio Revised Code Section 1531.08	Collection of wildlife specimens for Radiological Environmental Monitoring Program (REMP) Permit# 10-21 Issued: Annually Expires: 03/15/2011

APPENDIX D
CONSULTATION CORRESPONDENCE

D CONSULTATION CORRESPONDENCE

The Endangered Species Act of 1973, as amended; the Magnuson–Stevens Fisheries Management Act of 1996, as amended; and the National Historic Preservation Act of 1966 require that Federal agencies consult with applicable state and Federal agencies and groups prior to taking action that may affect threatened and endangered species, essential fish habitat, or historic and archaeological resources, respectively. This appendix contains consultation documentation.

Table D–1. Consultation Correspondences

This is a list of the consultation documents sent between the U.S. Nuclear Regulatory Commission (NRC) and other agencies that it is required to consult with based on National Environmental Policy Act (NEPA) requirements.

Author	Recipient	Date of Letter
NRC (David J. Wrona, Chief)	Advisory Council on Historic Preservation (Mr. Reid Nelson, Director)	November 22, 2010
NRC (David J. Wrona, Chief)	Ohio Historic Preservation Office (Mark Epsein)	December 7, 2010
U.S. Fish and Wildlife Service (USFWS) (Mary Knapp, Field Supervisor)	NRC (Cindy Bladey, Chief)	December 16, 2010
NRC (David J. Wrona, Chief)	USFWS (Mary Knapp, Field Supervisor)	June 1, 2011
NRC (David J. Wrona, Chief)	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) (Patricia Kurkul, Regional Administrator)	December 6, 2010
NRC (David J. Wrona, Chief)	Ohio Department of Natural Resources (David Graham, Chief)	November 22, 2010
NRC (David J. Wrona, Chief)	Ohio Department of Natural Resources (Brian Mitch, Environmental Review Manager)	November 23, 2010
NOAA NMFS (Mary A. Colligan, Assistant Regional Administrator)	NRC (David J. Wrona, Chief)	December 21, 2010
NRC (David J. Wrona, Chief)	Delaware Nation (Edgar L. French)	November 23, 2010
NRC (David J. Wrona, Chief)	Forest County Potawatomi Community (Harold G. Frank)	November 23. 2010
NRC (David J. Wrona, Chief)	Hannahville Indian Community Council (Kenneth Meshiguad)	November 23, 2010
NRC (David J. Wrona, Chief)	Miami Tribe of Oklahoma (Floyd E. Leonard)	November 23, 2010
NRC (David J. Wrona, Chief)	Shawnee Tribe (Ron Sparkman)	November 23, 2010
NRC (David J. Wrona, Chief)	Wyandotte Nation (Leaford Bearskin)	November 23, 2010

Author	Recipient	Date of Letter
NRC (David J. Wrona, Chief)	Peoria Tribe of Indians of Oklahoma (John P. Froman)	November 23, 2010
NRC (David J. Wrona, Chief)	Ottawa Tribe of Oklahoma (Charles Todd)	November 23, 2010
Peoria Tribe of Indians of Oklahoma (John P. Froman)	Chief, Rules and Directives Branch	December 8, 2010

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 22, 2010

Mr. Reid Nelson, Director
Advisory Council on Historic Preservation
Office of Federal Agency Programs
1100 Pennsylvania Ave, NW, Suite 803
Washington, DC 20004

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Nelson:

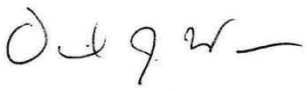
The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating license for Davis Besse Nuclear Power Station, Unit No. 1 (DBNPS). DBNPS is located in Oak Harbor, Ohio. The application for renewal was submitted by FENOC in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54.

The NRC has established that, as part of the staff's review of any nuclear power plant license renewal application, a site-specific Supplemental Environmental Impact Statement (SEIS) to its Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environmental Policy Act of 1969, as amended. The SEIS will include an analysis of pertinent environmental issues, and in accordance with 36 CFR 800.8(c), will include analyses of potential impacts to historic and cultural resources. The staff also plans to contact the Ohio State Historic Preservation Office during its review.

Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is August 2011.

The DBNPS license renewal application is available at: http://www.nrc.gov/reactors/operating/licensing/renewal/applications/davis-besse.html. If you have any questions concerning the staff's review of this license renewal application, please contact Ms. Paula Cooper, Project Manager, at 301-415-2323 or by e-mail at Paula.Cooper@nrc.gov.

Sincerely,



David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

cc: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 7, 2010

Mr. Mark Epstein
Department Head
Resource Protection and Review
Ohio Historic Preservation Office
182 Velma Avenue
Columbus, OH 43211-2497

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Epstein:

The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating license for Davis Besse Nuclear Power Station, Unit No.1 (DBNPS). DBNPS is located in Oak Harbor, OH. The application for renewal was submitted by FENOC in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54. The NRC has established that, as part of the staff's review of any nuclear power plant license renewal application, a site-specific Supplemental Environmental Impact Statement (SEIS) to its Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969, as amended. The NRC plans to coordinate compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended with NEPA in accordance with 36 CFR 800.8(c).

In the context of the NHPA, the staff has determined that the area of potential effect (APE) for a license renewal action is the area at the power plant site and its immediate environs that may be impacted by post-license renewal land-disturbing operations or projected refurbishment activities associated with the proposed action. The APE may extend beyond the immediate environs in those instances where post-license renewal land-disturbing operations or projected refurbishment activities specifically related to license renewal may potentially have an effect on known or proposed historic sites. This determination is made irrespective of ownership or control of the lands of interest. The SEIS will include an analysis of pertinent environmental issues and analyses of potential impacts to historic and cultural resources. The staff also plans to contact the Advisory Council on Historic Preservation Office during its review.

Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is August 2011.

The DBNPS license renewal application is available at:
http://www.nrc.gov/reactors/operating/licensing/renewal/applications/davis-besse.html.

If you have any questions concerning the staff's review of this license renewal application, please contact Ms. Paula Cooper, Project Manager, at 301-415-2323 or by e-mail at Paula.Cooper@nrc.gov.

Sincerely,

Oct 9, 2V

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

cc: Distribution via Listserv

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

December 16, 2010

Cindy Bladey, Chief RADB
Division of Administrative Services
Office of Administration
Mail Stop: TWB-05-B01M
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

10/28/10
75 FR 66399
(2)

Subject: Docket ID NRD-2010-0298

Dear Ms. Bladey:

TAILS #: 31420-2011-TA-0097

This is in response to the Nuclear Regulatory Commission's October 28, 2010 Federal Register Notice of Intent to Prepare an Environmental Impact Statement (EIS) and to conduct the scoping process for Davis-Besse Nuclear Power Station, Unit 1. FirstEnergy Nuclear Operating Company (FENOC) has submitted an application for renewal of Facility Operating License No. NPF-003 for an additional 20 years of operation at David-Besse Nuclear Power Station, Unit 1, located in Oak Harbor, Ottawa County, Ohio. The EIS is being prepared as part of this application process.

There are no Federal wilderness areas or designated critical habitat within the vicinity of the proposed site. Davis-Besse consists of 954 acres, of which approximately 733 acres are marshland that is leased to the U.S. government as part of the Ottawa National Wildlife Refuge.

In a letter dated December 16, 2009, we provided comments to FENOC on the proposed 20-year renewal of the operating license for Davis-Besse. At this time we have no additional comments.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act of 1973 (ESA), as amended, and are consistent with the intent of the National Environmental Policy Act of 1969 and the U. S. Fish and Wildlife Service's Mitigation Policy.

If you have questions, or if we may be of further assistance in this matter, please contact Angela Boyer at extension 22 in this office.

Sincerely,

Mary Knapp

Mary M. Knapp, Ph.D.
Field Supervisor

cc: ODNR, DOW, SCEA Unit, Columbus, Ohio

SUNSI Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = P. Cooper (pec)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 1, 2011

Ms. Mary Knapp
Field Supervisor
U.S. Fish and Wildlife Service
Ohio Ecological Services Field Office
4625 Morse Rd., Suite 104
Columbus, OH 43230

SUBJECT: REQUEST FOR LIST OF FEDERALLY PROTECTED SPECIES AND IMPORTANT HABITATS WITHIN THE AREA UNDER EVALUATION FOR THE DAVIS-BESSE NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Knapp:

The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating license for the Davis-Besse Nuclear Power Station, Unit 1 (DBNPS). DBNPS is located 25 miles east of Toledo, OH. The application for renewal was submitted by FENOC in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). The NRC has established that, as part of the staff's review of any nuclear power plant license renewal application, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environmental Policy Act (NEPA) of 1969, as amended. The SEIS includes an analysis of pertinent environmental issues, impacts to endangered or threatened species, habitats, and impacts to other fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended.

FENOC stated that it has no plans to alter current operations over the license renewal period. DBNPS, operating under a renewed license, would use existing plant facilities and transmission lines, and would not require additional construction or disturbance of new areas. According to FENOC, any maintenance activities would be limited to previously disturbed areas. The DBNPS site consists of 954 acres, of which approximately 733 acres are marshland currently leased to the U.S. Government as a national wildlife refuge.

As part of the SEIS preparation, the applicable transmission line corridors will be reviewed. The DBNPS 345 kilovolt (kV) switchyard is adjacent to the plant and centrally located on the property. From the switchyard, three 345 kV transmission lines connect DBNPS to the power grid. The transmission lines labeled Bay Shore Line, Lemoyne Line, and Beaver Line are shown on the attached enclosures. Please see the map in Enclosure 4 for further detail.

In response to the *Federal Register* notice, issued on October 18, 2010, "Nuclear Regulatory Commission, FirstEnergy Nuclear Operating Company, Notice of Intent to Prepare an Environmental Impact Statement and Conduct the Scoping Process for Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346," Fish and Wildlife Service's (FWS) submitted a letter

to the NRC, ADAMS Accession Number ML110060289, indicating that there are no Federal wilderness areas or designated critical habitat within the vicinity of the proposed site. In addition, FWS participated in the environmental audit held the week of March 7, 2011. As a result of the audit and FWS involvement, three additional threatened or endangered species were discovered to be known to or likely to occur near the DBNPS site.

To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests concurrence on the enclosed table of Federally threatened, endangered, proposed, and candidate species that may be in the vicinity of the DBNPS site and its associated transmission line rights-of-way. Please provide any additional information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

If you have any questions concerning the NRC staff's review of this license renewal application, please contact Ms. Paula Cooper, License Renewal Project Manager, at 301-415-2323 or by e-mail at Paula.Cooper@nrc.gov.

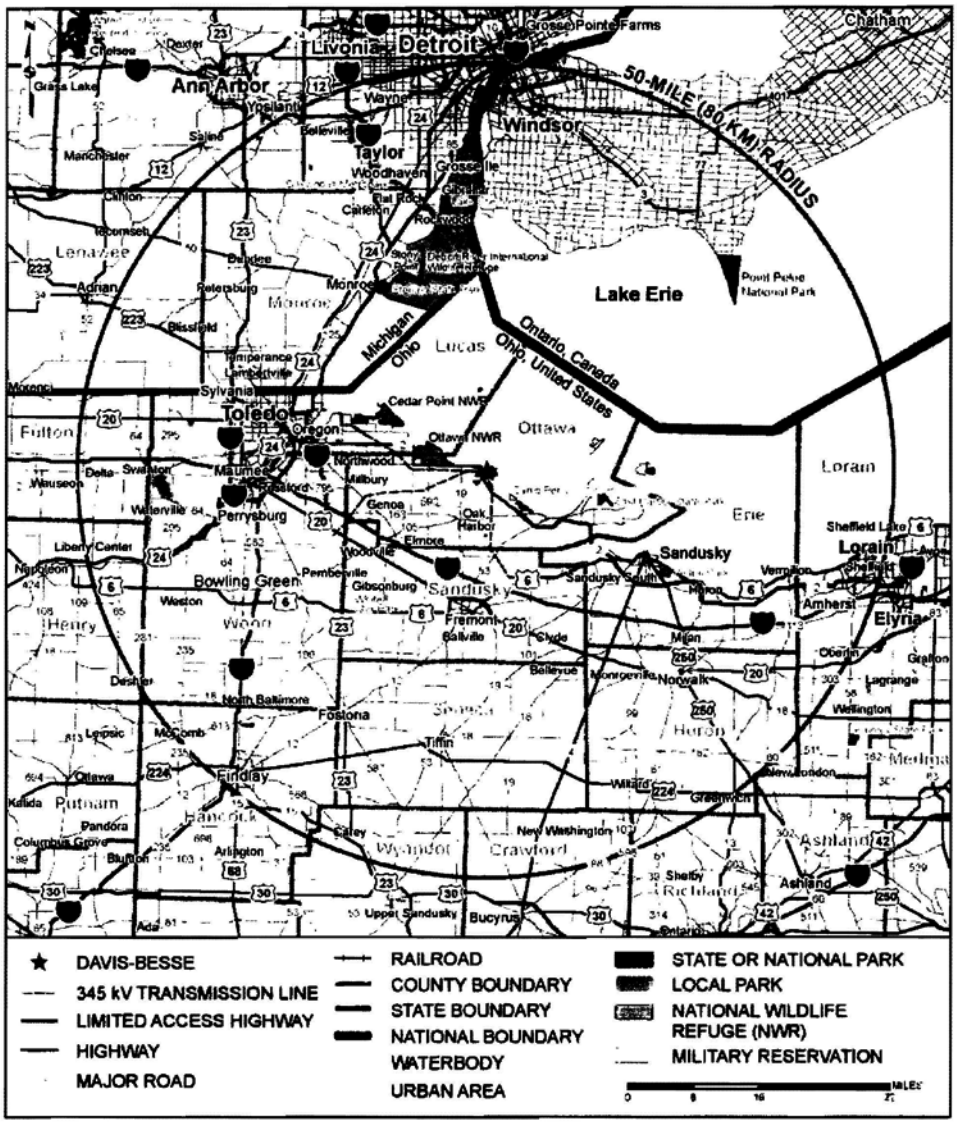
Sincerely,

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

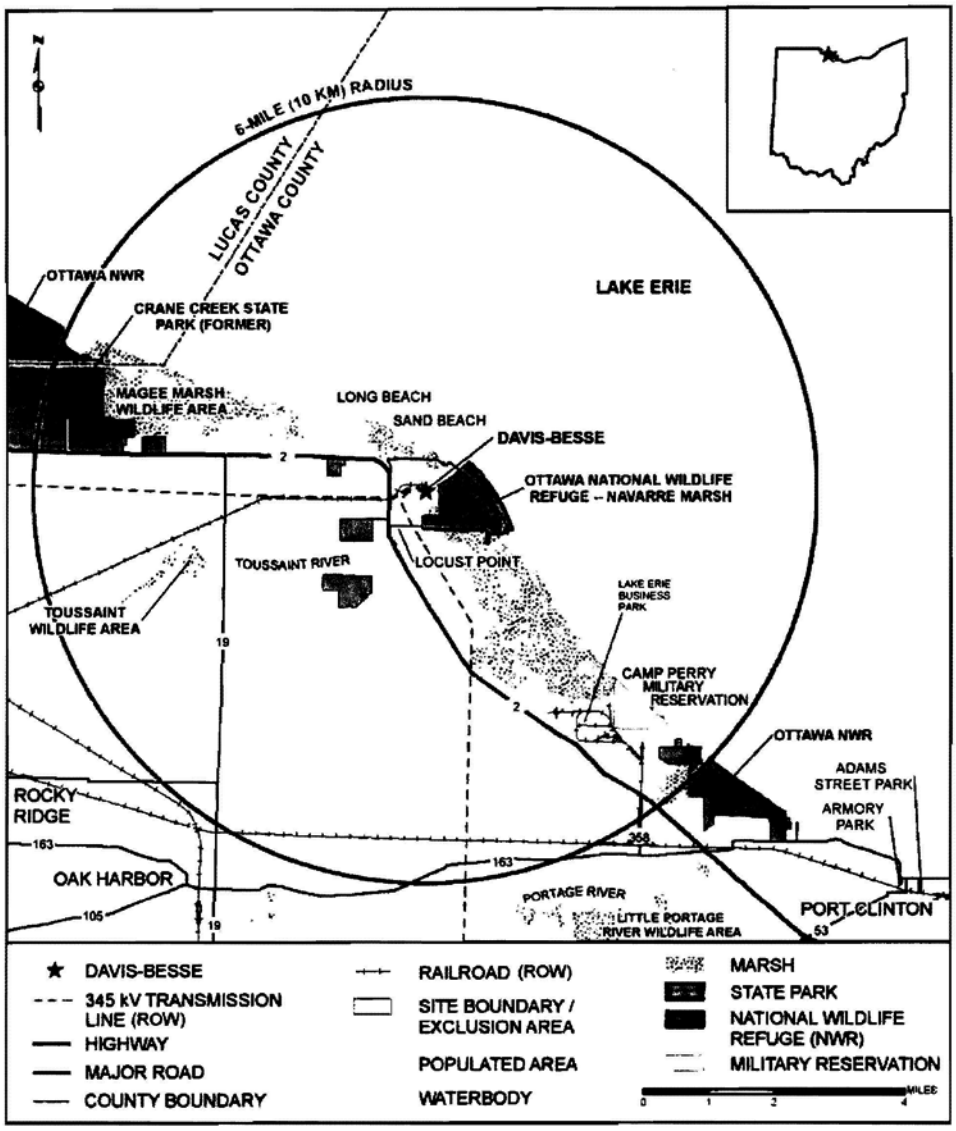
Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map
5. Federal T&E Species Table

cc w/encls: Listserv


50-MILE (80-KM) RADIUS
Lake Erie
Detroit
Windsor
Toledo
Ann Arbor
Livonia
Taylor
Sandusky
Lorain
Elyria
Findlay
Bowling Green
Fostoria
Tiffin
Ashland
Michigan
Ohio
Ontario, Canada
Ohio, United States
DAVIS-BESSE
345 kV TRANSMISSION LINE
LIMITED ACCESS HIGHWAY
HIGHWAY
MAJOR ROAD
RAILROAD
COUNTY BOUNDARY
STATE BOUNDARY
NATIONAL BOUNDARY
WATERBODY
URBAN AREA
STATE OR NATIONAL PARK
LOCAL PARK
NATIONAL WILDLIFE REFUGE (NWR)
MILITARY RESERVATION

ENCLOSURE 1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OTTAWA COUNTY
LAKE ERIE
OTTAWA NWR
CRANE CREEK STATE PARK (FORMER)
MAGEE MARSH WILDLIFE AREA
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HIGHWAY
MAJOR ROAD
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WATERBODY
MARSH
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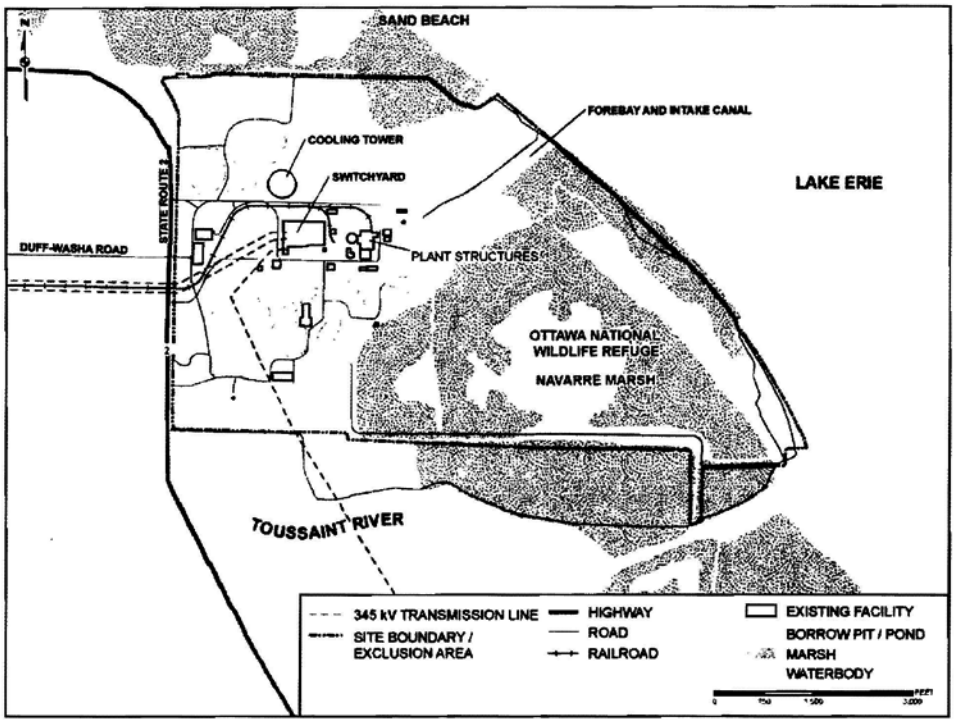
MILITARY RESERVATION
MILES

ENCLOSURE 2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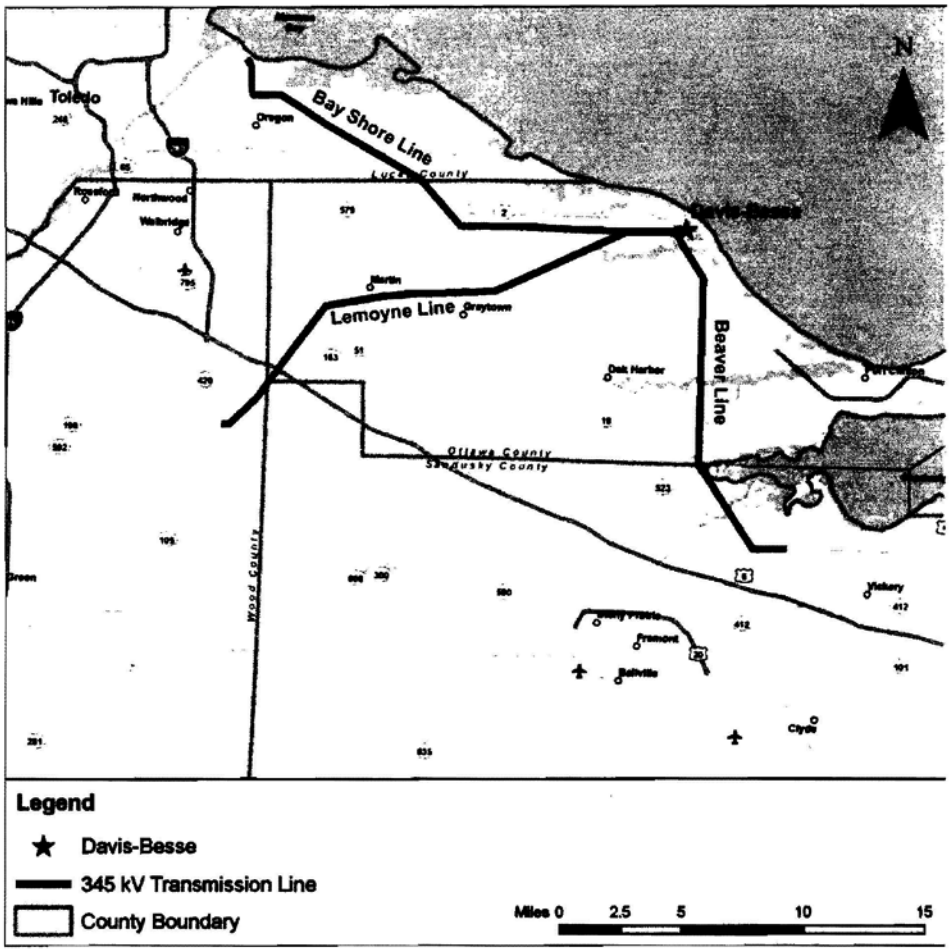
ENCLOSURE 3


N
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Bay Shore Line
Lemoyne Line
Beaver Line
Ottawa County
Sandusky County
Wood County
Legend
Davis-Besse
345 kV Transmission Line
County Boundary
Miles 0 2.5 5 10 15

ENCLOSURE 4

Federally Listed Species Near the Davis-Besse Site and Transmission Line ROWs

Scientific Name	Common Name	Federal Status[a]	State Status[b]	County(ies) of Occurrence[c]			
				Ottawa	Lucas	Sandusky	Wood
Amphibians							
NONE							
Birds							
Charadrius melodus	piping plover	E	E	x	x	x	
Dendroica kirtlandii	Kirtland's warbler	E	E	x	x	x	
Fish							
NONE							
Insects							
Lycaeides melissa samuelis	karner blue butterfly	E	E		x		
Freshwater Mussels							
Epioblasma torulosa rangiana	northern riffleshell	E	E	x			
Villosa fabalis	rayed bean	PE	E				
Mammals							
Myotis sodalis	indiana bat	E	E	x	x	x	x
Plants							
Platanthera leucophaea	eastern prairie fringed orchid	T	T	x	x	x	
Tetraneuris herbacea	lakeside daisy	T	E	x			
Reptiles							
Nerodia sipedon insularum	Lake Erie water snake	T	E	x			
Sistrurus catenatus	eastern massasauga	C	E	x	x	x	

[a] C= Candidate; DL = Delisted; E = Federally endangered; PE = proposed endangered; T = Federally threatened; - = No listing

[b] E = Endangered; T = Threatened; SC = Species of Concern

[c] The Davis-Besse site is located in Ottawa County, Ohio. The transmission lines associated with the Davis-Besse site traverse Ottawa County, as well as Lucas, Sandusky, and Wood Counties.

ENCLOSURE 5

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 6, 2010

Ms. Patricia Kurkul, Regional Administrator
NOAA Fisheries Service
Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930-2276

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE DAVIS-BESSE NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION REVIEW

Dear Ms. Kurkul:

The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating license for Davis-Besse Nuclear Power Station (DBNPS). DBNPS is located 25 miles east of Toledo, OH. The application for renewal was submitted by FENOC in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). The NRC has established that, as part of the staff's review of any nuclear power plant license renewal application, a site-specific Supplemental Environmental Impact Statement (SEIS) to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environmental Policy Act of 1969, as amended. The SEIS includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended.

FENOC stated that it has no plans to alter current operations over the license renewal period. DBNPS, operating under a renewed license, would use existing plant facilities and transmission lines, and would not require additional construction or disturbance of new areas. According to FENOC, any maintenance activities would be limited to previously disturbed areas. The DBNPS site consists of 954 acres, of which approximately 733 acres are marshland currently leased to the U.S. Government as a national wildlife refuge.

As part of the SEIS preparation, the applicable transmission line corridors will be reviewed. The DBNPS 345 kilovolt (kV) switchyard is adjacent to the plant centrally located on the property. From here, three 345 kV transmission lines connect DBNPS to the power grid. The transmission lines labeled Bay Shore Line, Lemoyne Line, and Beaver Line are shown on the attached enclosure. Please see the map in Enclosure 4 for further detail.

The NRC staff is aware of your letter dated January 15, 2010, to Clifford I. Custer of Davis-Besse Nuclear Power Station, indicating "No species listed by NMFS are known to occur on Lake Erie," as well as, "No essential fish habitat (EFH) as designated by the Magnuson-Steven Fisheries Management and Conservation Act occurs in the vicinity of the facility."

To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests confirmation that further coordination is not necessary. If new information has been found and further coordination is necessary the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of DBNPS and its associated transmission line rights-of-way. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

Your office will receive a copy of the draft SEIS along with a request for comments. The anticipated publication date for the draft SEIS is August 2011.

The DBNPS license renewal application is available at:

http://www.nrc.gov/reactors/operating/licensing/renewal/applications/davis-besse.html.

If you have any questions concerning the staffs review of this license renewal application, please contact Ms. Paula Cooper, Project Manager, at (301) 415-2323 or by e-mail at paula.cooper@nrc.gov.

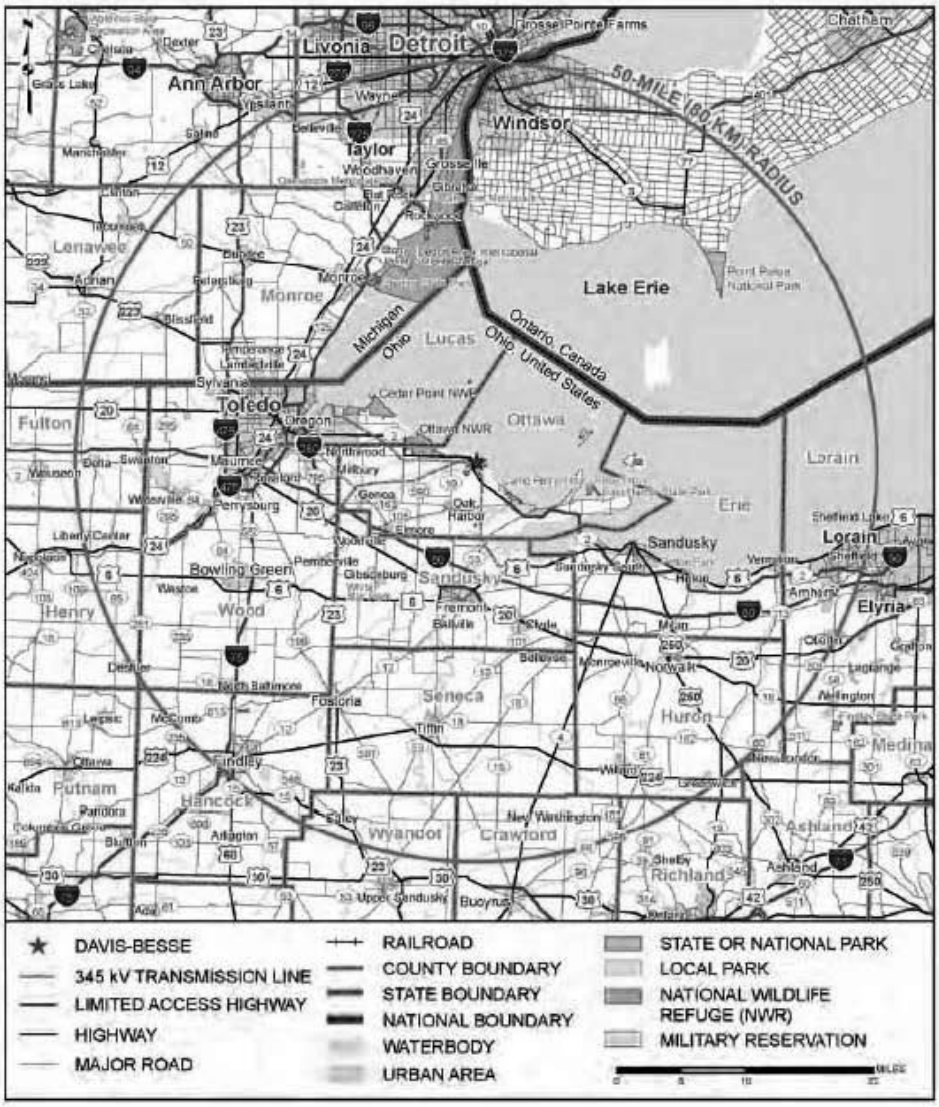
Sincerely,

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

cc w/encls: Distribution via Listserv


Livonia
Detroit
Ann Arbor
Windsor
Taylor
50-MILE (80 KM) RADIUS
Lake Erie
Lenawee
Monroe
Michigan
Ohio
Lucas
Ontario, Canada
Ohio, United States
Toledo
Fulton
Ottawa
Lorain
Erie
Sandusky
Bowling Green
Henry
Wood
Seneca
Huron
Medina
Putnam
Hancock
Wyandot
Crawford
Richland
Ashland
Elyria
DAVIS-BESSE
345 kV TRANSMISSION LINE
LIMITED ACCESS HIGHWAY
HIGHWAY
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RAILROAD
COUNTY BOUNDARY
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NATIONAL BOUNDARY
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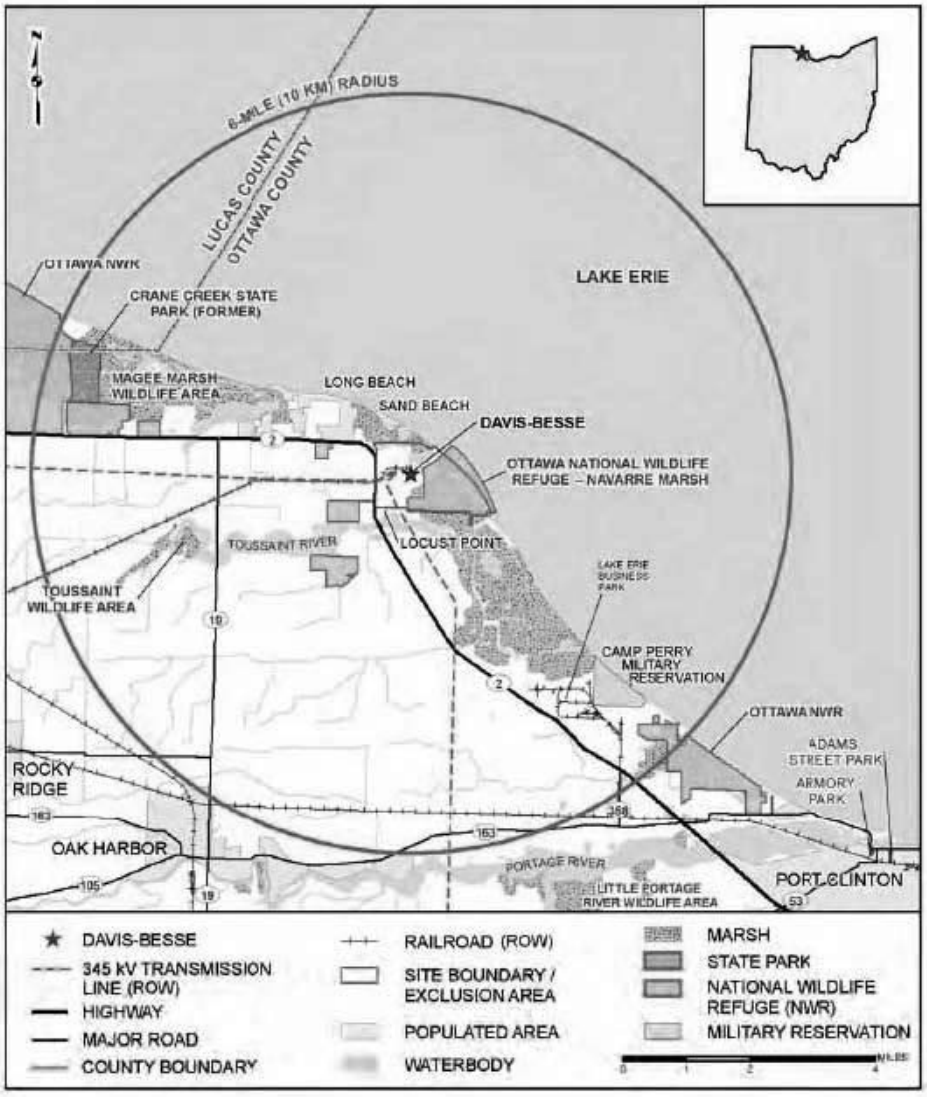
MILITARY RESERVATION

ENCLOSURE 1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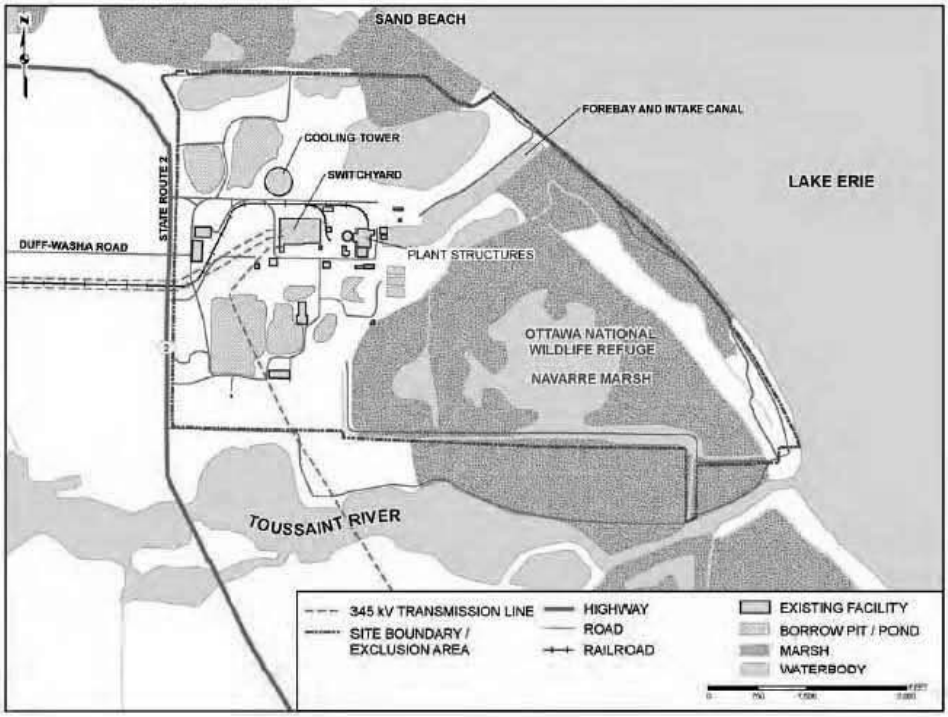
ENCLOSURE 2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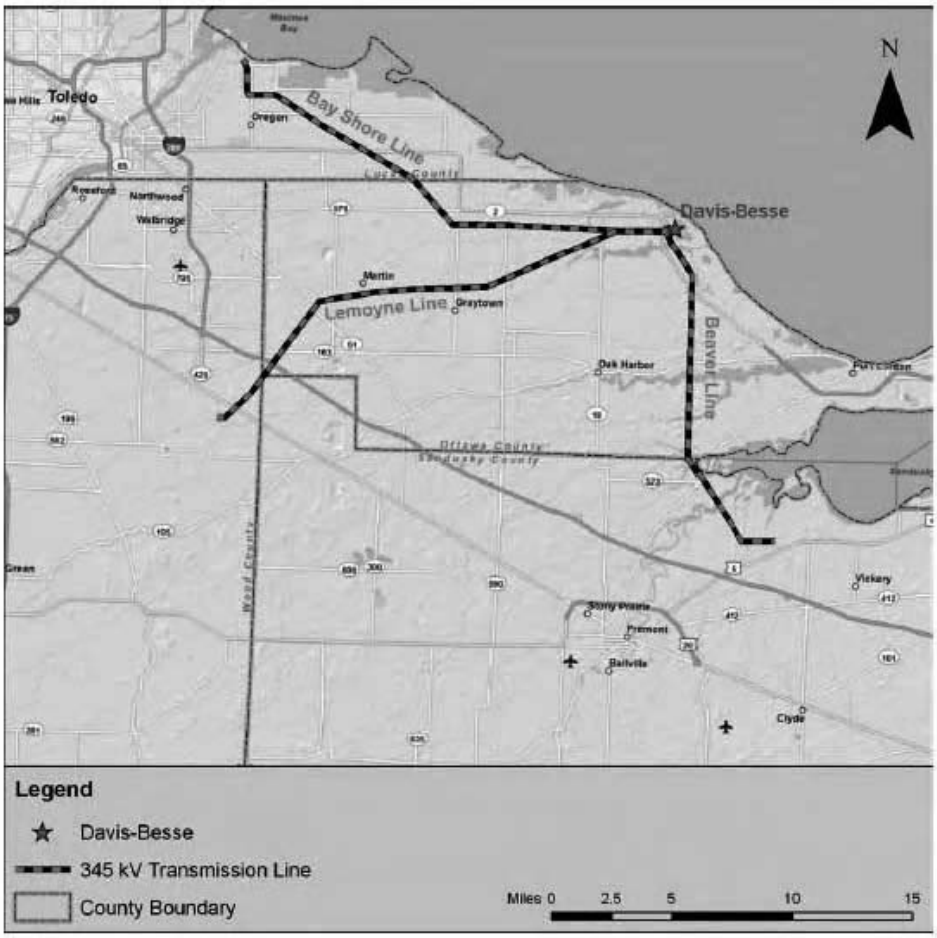
ENCLOSURE 3


N
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Oregon
Bay Shore Line
Lucas County
Davis-Besse
Northwood
Wellbridge
Martin
Lemoyne Line
Graytown
Beaver Line
Oak Harbor
Ottawa County
Sandusky County
Wood County
Vickery
Fremont
Ballville
Clyde
Legend
Davis-Besse
345 kV Transmission Line
County Boundary
Miles 0 2.5 5 10 15

ENCLOSURE 4

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 22, 2010

Mr. David Graham, Chief
Division of Wildlife
Ohio Department of Natural Resources
2045 Morse Rd., Bldg G-3
Columbus, OH 43229-6693

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE DAVIS-BESSE NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Graham:

The U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the operating license for Davis-Besse Nuclear Power Station, Unit No. 1 (DBNPS). DBNPS is located 25 miles east of Toledo, OH. The application for renewal was submitted by FENOC, in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). The NRC has established that, as part of the staff's review of any nuclear power plant license renewal application, a site-specific Supplemental Environmental Impact Statement (SEIS) to its Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environmental Policy Act of 1969, as amended. The SEIS includes an analysis of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife. This letter is being submitted under the provisions of the Endangered Species Act of 1973, as amended, and the Fish and Wildlife Coordination Act of 1934, as amended.

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As part of the SEIS preparation, the applicable transmission line corridors will be reviewed. The DBNPS 345 kilovolt (kV) switchyard is adjacent to the plant centrally located on the property. From here, three 345 kV transmission lines connect DBNPS to the power grid. The transmission lines labeled Bay Shore Line, Lemoyne Line, and Beaver Line are shown on the attached enclosure. Please see the map in Enclosure 4 for further detail.

To support the SEIS preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of DBNPS and its associated transmission line rights-of-way. In addition, please provide any information you consider appropriate under the provisions of the Fish and Wildlife Coordination Act.

Your office will receive a copy of the draft EIS along with a request for comments. The anticipated publication date for the draft EIS is August 2011.

The DBNPS license renewal application is available at: http://www.nrc.gov/reactors/operating/licensing/renewal/applications/davis-besse.html.

If you have any questions concerning the staff's review of this license renewal application, please contact Ms. Paula Cooper, Project Manager, at 301-415-2323 or by e-mail at Paula.Cooper@nrc.gov.

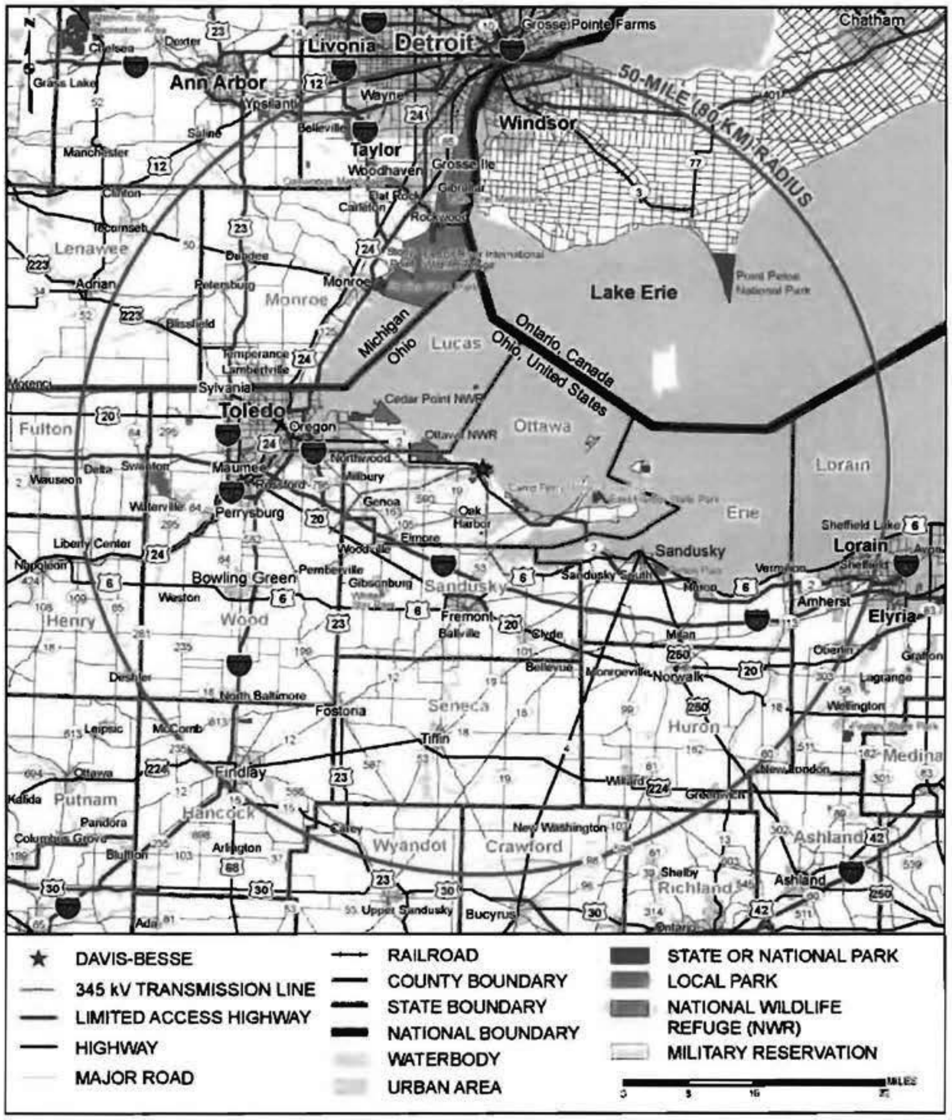
Sincerely,

David J. Wrona
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

cc w/encls: Distribution via Listserv


50-MILE (80 KM) RADIUS
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Ontario, Canada
Ohio, United States
Michigan
Ohio
Detroit
Windsor
Toledo
Ann Arbor
Sandusky
Lorain
Elyria
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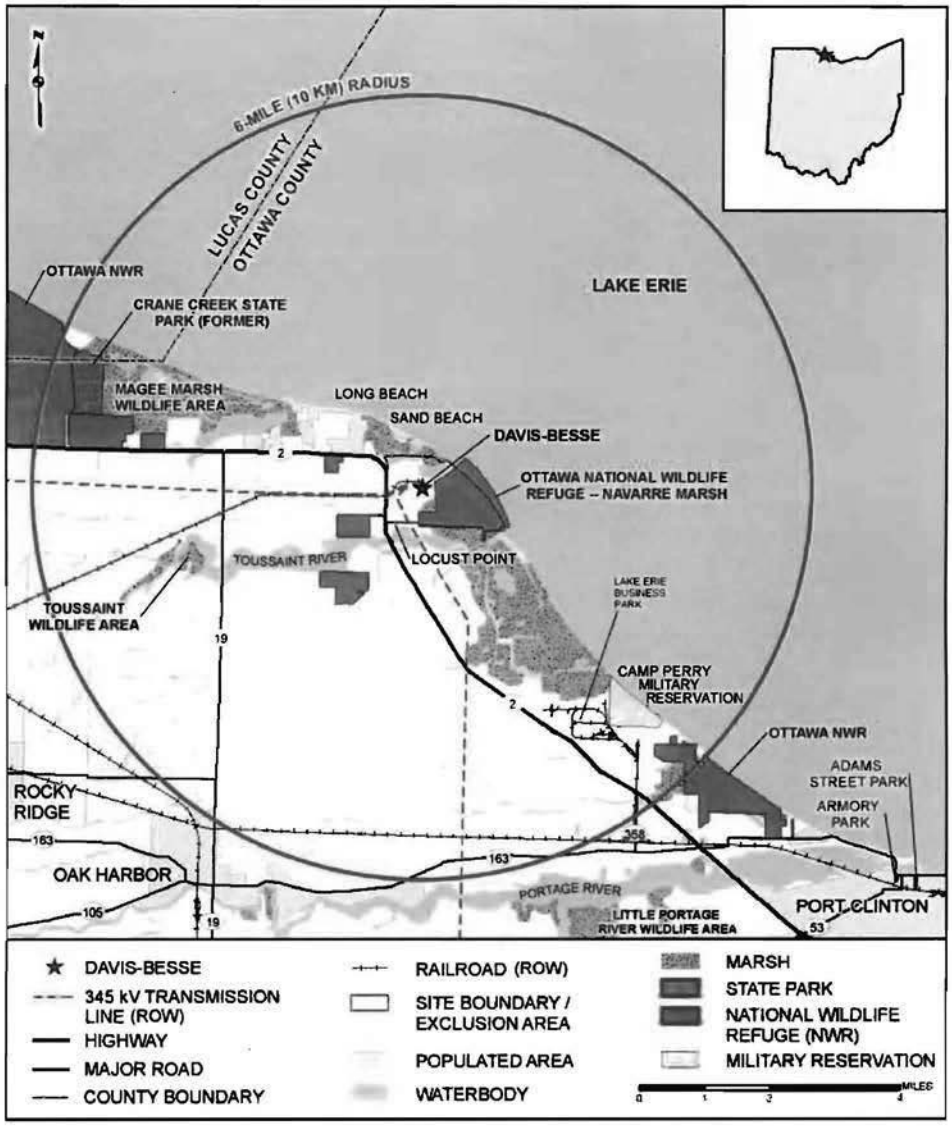
ENCLOSURE 1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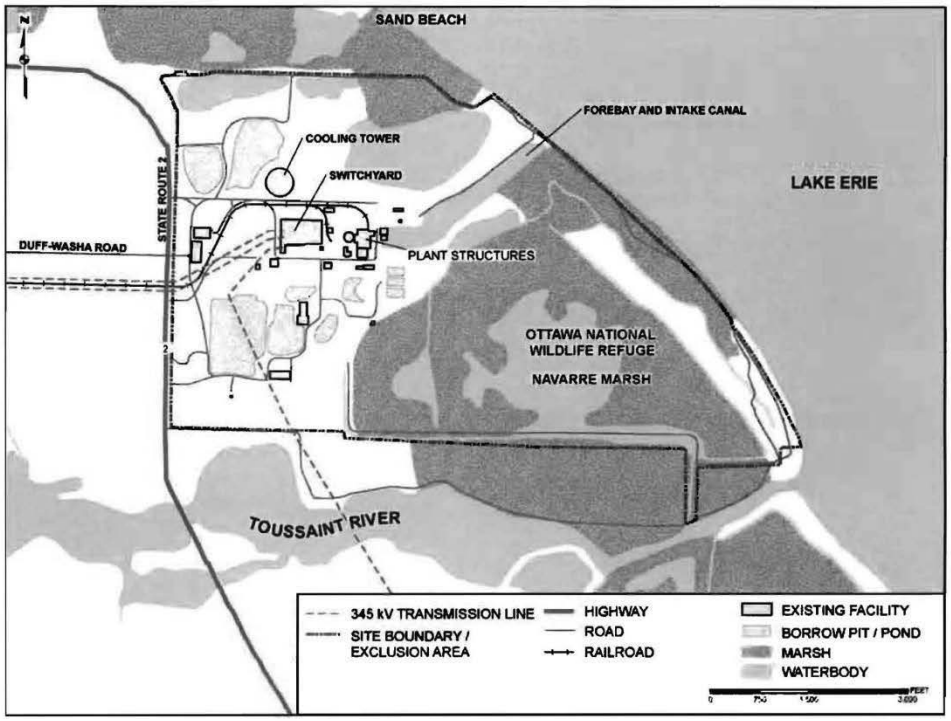
ENCLOSURE 2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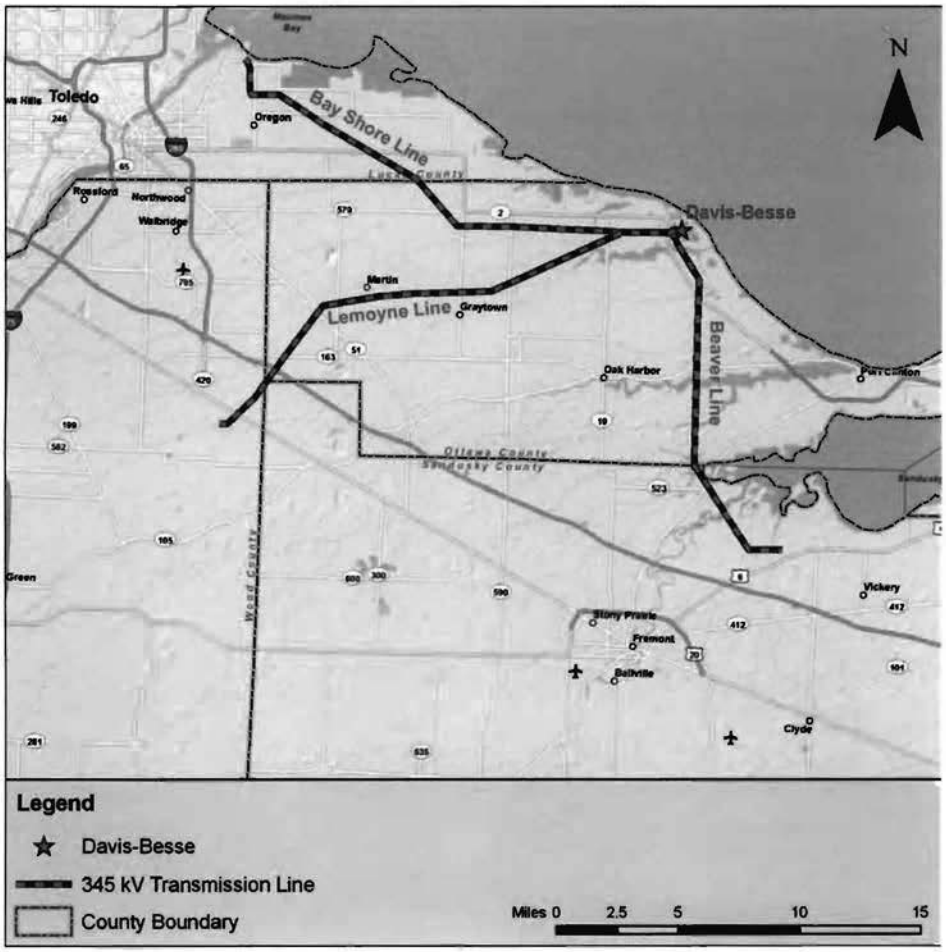
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ENCLOSURE 4

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Brian Mitch, Environmental Review Manager
Ohio Department of Natural Resources
Division of Engineering
Environmental Services Section
2045 Morse Rd., Building F-3
Columbus, OH 43229-6693

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER EVALUATION FOR THE DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

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Sincerely,

David J. Wrona
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

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2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

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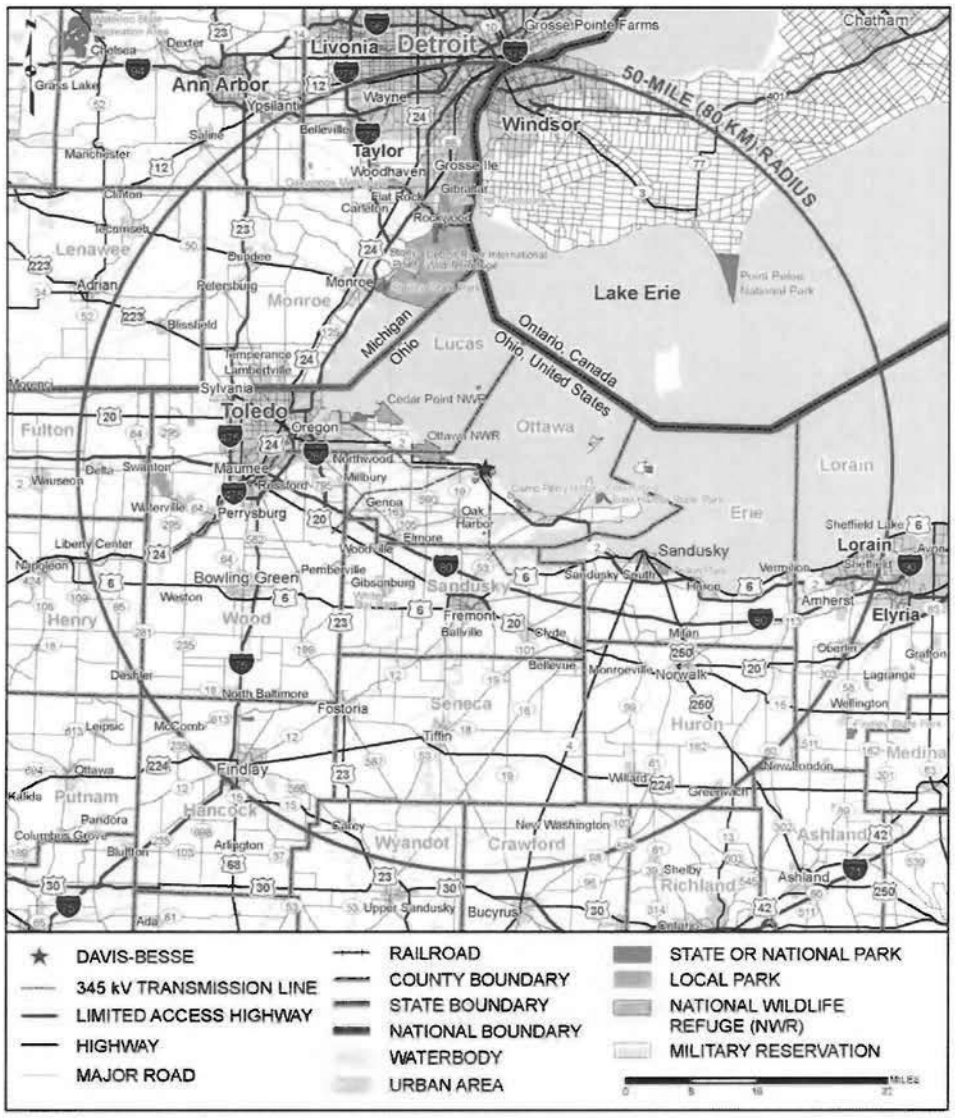
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Ohio, United States
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Lucas
Ottawa
Erie
Lorain
Sandusky
Seneca
Huron
Wood
Henry
Putnam
Hancock
Wyandot
Crawford
Richland
Ashland
Medina
Bowling Green
Findlay
Fremont
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Perrysburg
Oregon
Sylvania
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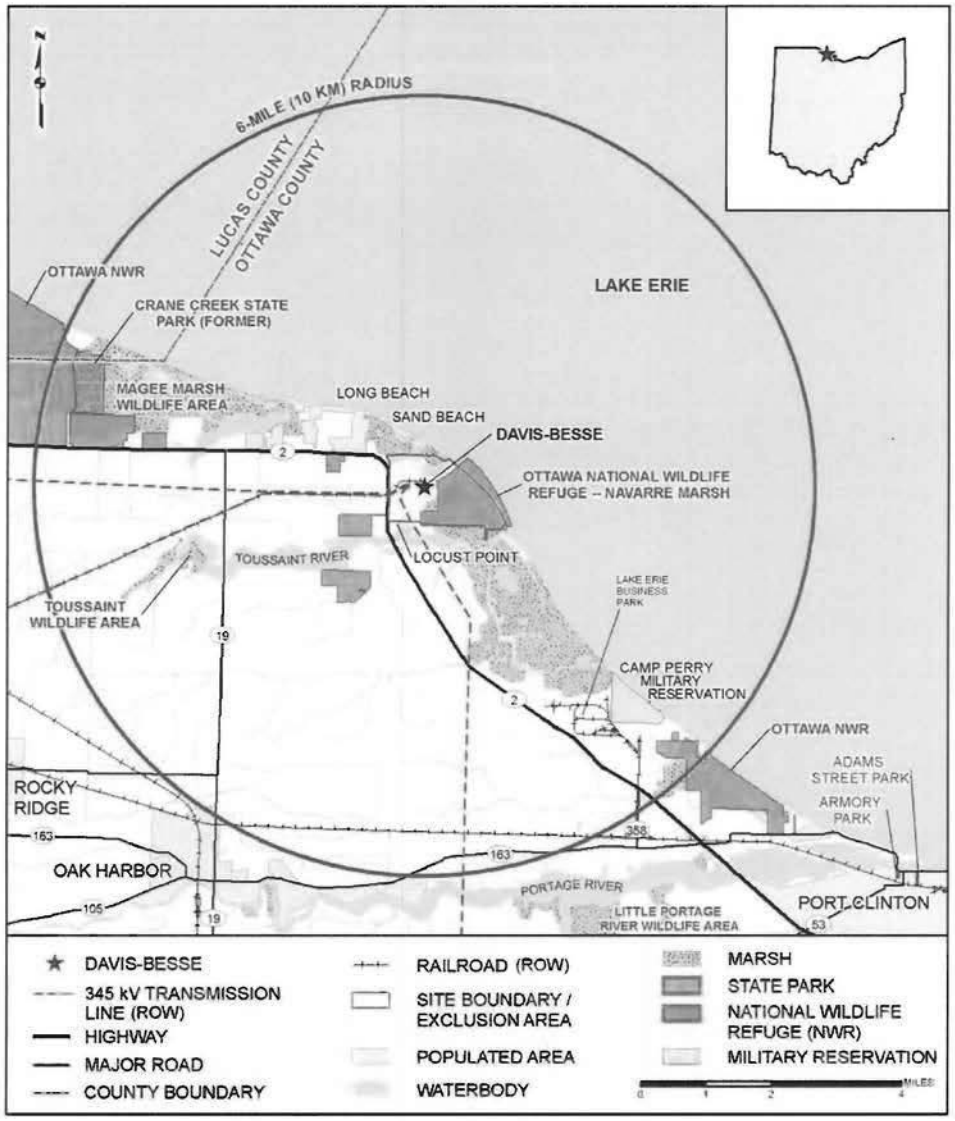
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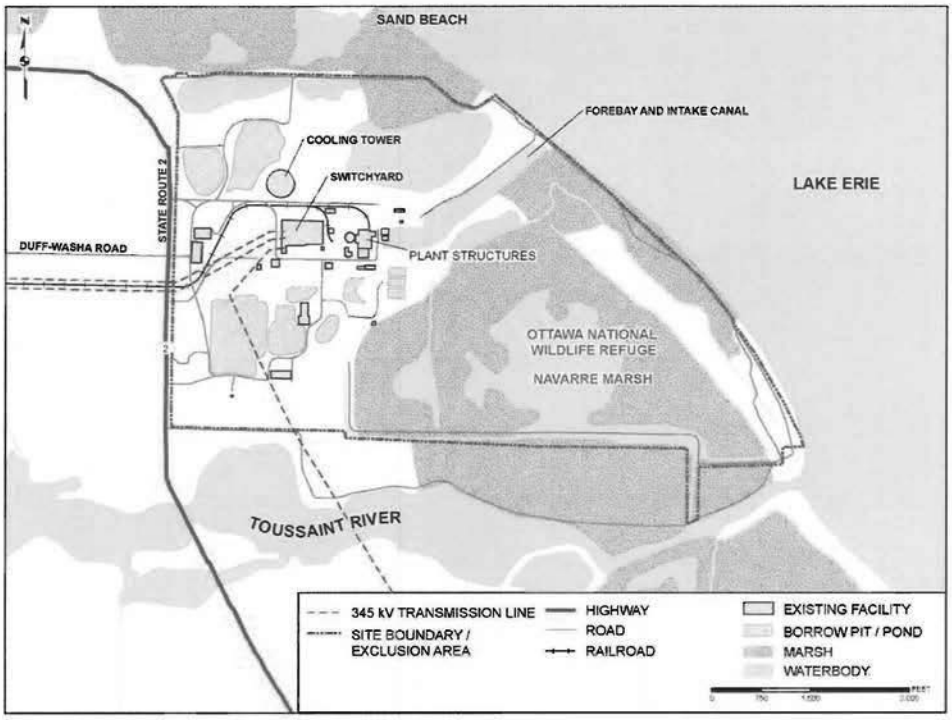
MILES

ENCLOSURE 2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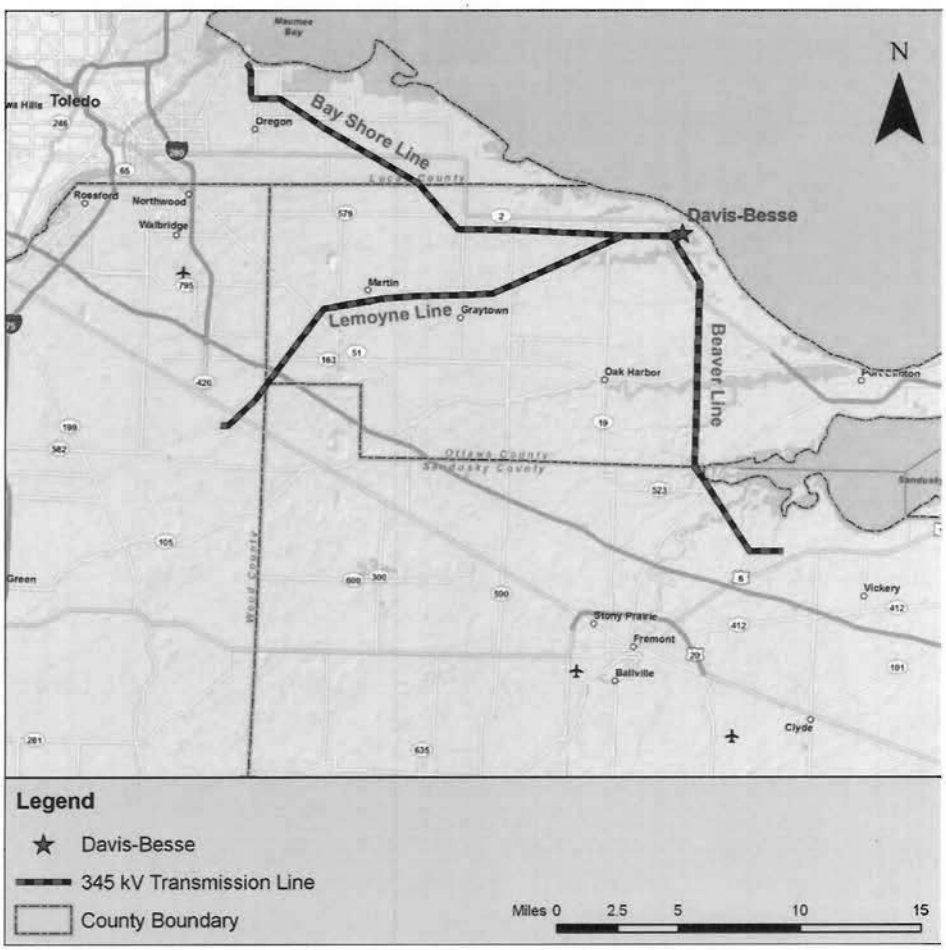
FOREBAY AND INTAKE CANAL
COOLING TOWER
SWITCHYARD
LAKE ERIE
STATE ROUTE 2
DUFF-WASHA ROAD
PLANT STRUCTURES
OTTAWA NATIONAL
WILDLIFE REFUGE
NAVARRE MARSH
TOUSSAINT RIVER
345 kV TRANSMISSION LINE
SITE BOUNDARY /
EXCLUSION AREA
HIGHWAY
ROAD
RAILROAD
EXISTING FACILITY
BORROW PIT / POND
MARSH
WATERBODY

ENCLOSURE 3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Toledo
Oregon
Bay Shore Line
Lucas County
Roosford
Northwood
Walbridge
Davis-Besse
Martin
Lemoyne Line
Graytown
Oak Harbor
Beaver Line
Ottawa County
Sandusky County
Wood County
Green
Vickery
Stony Prairie
Fremont
Ballville
Clyde
Legend
Davis-Besse
345 kV Transmission Line
County Boundary
Miles 0 2.5 5 10 15

ENCLOSURE 4

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

DEC 21 2010

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Davis-Besse Nuclear Power Station

Dear Mr. Wrona,

This is in response to your letter dated December 6, 2010 requesting information on the presence of listed species in the vicinity of the Davis-Besse Nuclear Power Station, located 25 miles east of Toledo, Ohio.

No species listed under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS) are known to occur in the vicinity of your proposed project. As such, NMFS Protected Resources Division does not intend to offer additional comments on this proposal. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. If you have any questions regarding these comments, please contact Danielle Palmer at (978) 282-8468.

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

File Code: Sec 7 – No Species Present 2010

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Edgar L. French
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. French:

The U.S. Nuclear Regulatory Commission (NRC) is considering an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the Davis-Besse Nuclear Power Station, Unit No. 1 (DBNPS) operating license. DBNPS is located 25 miles east of Toledo, Ohio. The application for renewal was submitted by FENOC, in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). As part of the NRC's review, a site-specific supplemental environmental impact statement (SEIS) to its Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS), NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environment Policy Act of 1969, as amended. The SEIS will include an analysis of environmental issues, and in accordance with 36 CFR 800.8©, will include analyses of potential impacts to historic and cultural resources.

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Chief, Rules, Announcements, and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop TWB-05-B01M
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Electronic comments may be submitted to the NRC by e-mail at Paula.Cooper@nrc.gov.

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Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Harold G. Frank
Forest County Potawatomi Community
Community of Wisconsin
P.O. Box 340
Crandon, WI 54520

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. French:

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Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

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2. Area Map, 6-mile radius
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Kenneth Meshiguad
Hannahville Indian Community Council
N14911 Hannahville B1 Road
Wilson, MI 49896

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Meshiguad:

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U.S. Nuclear Regulatory Commission
Washington, DC 20555

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Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Floyd E. Leonard
Miami Tribe of Oklahoma
P.O. Box 1326
Miami, OK 74355

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Leonard:

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F. Leonard - 2 -

Chief, Rules, Announcements, and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop TWB-05-B01M
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
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4. Transmission Line Map

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Ron Sparkman
Shawnee Tribe
P.O. Box 189
Miami, OK 74355

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Sparkman:

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Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Leaford Bearskin
Wyandotte Nation
P.O. Box 250
Wyandotte, OK 74370

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Bearskin:

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Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

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3. Site Area Map
4. Transmission Line Map

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. John P. Froman
Peoria Tribe of Indians of Oklahoma
P.O. Box 1527
Miami, OK 74355

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Froman:

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The Davis Besse Nuclear Power Station license renewal application is available at: http://www.nrc.gov/reactors/operating/licensing/renewal/applications/davis-besse.html.

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The GEIS, which assesses the scope and impact of environmental effects that would be associated with renewal of any nuclear power plant site, can be found on the NRC's website at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/.

The NRC expects to publish the draft SEIS in August 2011. A copy of the document will be sent to you for your review and comment. After consideration of public comments received, the NRC will prepare a final SEIS, which is scheduled to be issued in April 2012. If you have any questions concerning the NRC's review of this license renewal application, please contact Ms. Paula Cooper, Project Manager, at 301-415-2323 or by e-mail at Paula.Cooper@nrc.gov.

Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 23, 2010

Mr. Charles Todd
Ottawa Tribe of Oklahoma
P.O. Box 110
811 Third Avenue NE
Miami, OK 74355

SUBJECT: REQUEST FOR SCOPING COMMENTS CONCERNING THE DAVIS-BESSE NUCLEAR POWER PLANT, UNIT NO. 1, LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Todd:

The U.S. Nuclear Regulatory Commission (NRC) is considering an application submitted by FirstEnergy Nuclear Operating Company (FENOC), for the renewal of the Davis-Besse Nuclear Power Station, Unit No. 1 (DBNPS) operating license. DBNPS is located 25 miles east of Toledo, Ohio. The application for renewal was submitted by FENOC, in a letter dated August 27, 2010, pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54). As part of the NRC's review, a site-specific supplemental environmental impact statement (SEIS) to its Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS), NUREG-1437, will be prepared under 10 CFR Part 51, the NRC's regulation that implements the National Environment Policy Act of 1969, as amended. The SEIS will include an analysis of environmental issues, and in accordance with 36 CFR 800.8(c), will include analyses of potential impacts to historic and cultural resources.

Under NRC regulations, the original operating license for a nuclear power plant is issued for up to 40 years, and the license may be renewed for up to 20 years. The current operating license for DBNPS will expire in April 2017. FENOC has no plans to change current operations during the license renewal period. DBNPS would use existing plant facilities and transmission lines and would not construct or disturb undeveloped portions of the site. According to FENOC, any maintenance activities would be limited to previously disturbed areas of the plant site. Please see the enclosed maps and pictures, which show the area under review.

The NRC is also requesting comments on its environmental review from the following contacts, who will receive a copy of this letter: Delaware Nation, Forest County Potawatomi Community, Hannahville Indian Community, Miami Tribe of Oklahoma, Shawnee Tribe, Wyandotte Nation, Peoria Tribe of Indians of Oklahoma and Ottawa Tribe of Oklahoma. Please submit any comments and questions that you may have on the environmental review by December 27, 2010. Written comments should be submitted by mail to:

Chief, Rules, Announcements, and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop TWB-05-B01M
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Electronic comments may be submitted to the NRC by e-mail at Paula.Cooper@nrc.gov.

The Davis Besse Nuclear Power Station license renewal application is available at: http://www.nrc.gov/reactors/operating/licensing/renewal/applications/davis-besse.html.

In addition, the Ida Rupp Public Library, 310 Madison Street, Port Clinton, Ohio 43452 and the Toledo-Lucas County Public Library, 325 North Michigan Street, Toledo, Ohio 43604, has agreed to make the application available for public inspection. Public comments and supporting materials related to this notice can be found at the Federal rulemaking website, http://www.regulations.gov, by searching on Docket ID NRC-2010-0298.

The GEIS, which assesses the scope and impact of environmental effects that would be associated with renewal of any nuclear power plant site, can be found on the NRC's website at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/.

The NRC expects to publish the draft SEIS in August 2011. A copy of the document will be sent to you for your review and comment. After consideration of public comments received, the NRC will prepare a final SEIS, which is scheduled to be issued in April 2012. If you have any questions concerning the NRC's review of this license renewal application, please contact Ms. Paula Cooper, Project Manager, at 301-415-2323 or by e-mail at Paula.Cooper@nrc.gov.

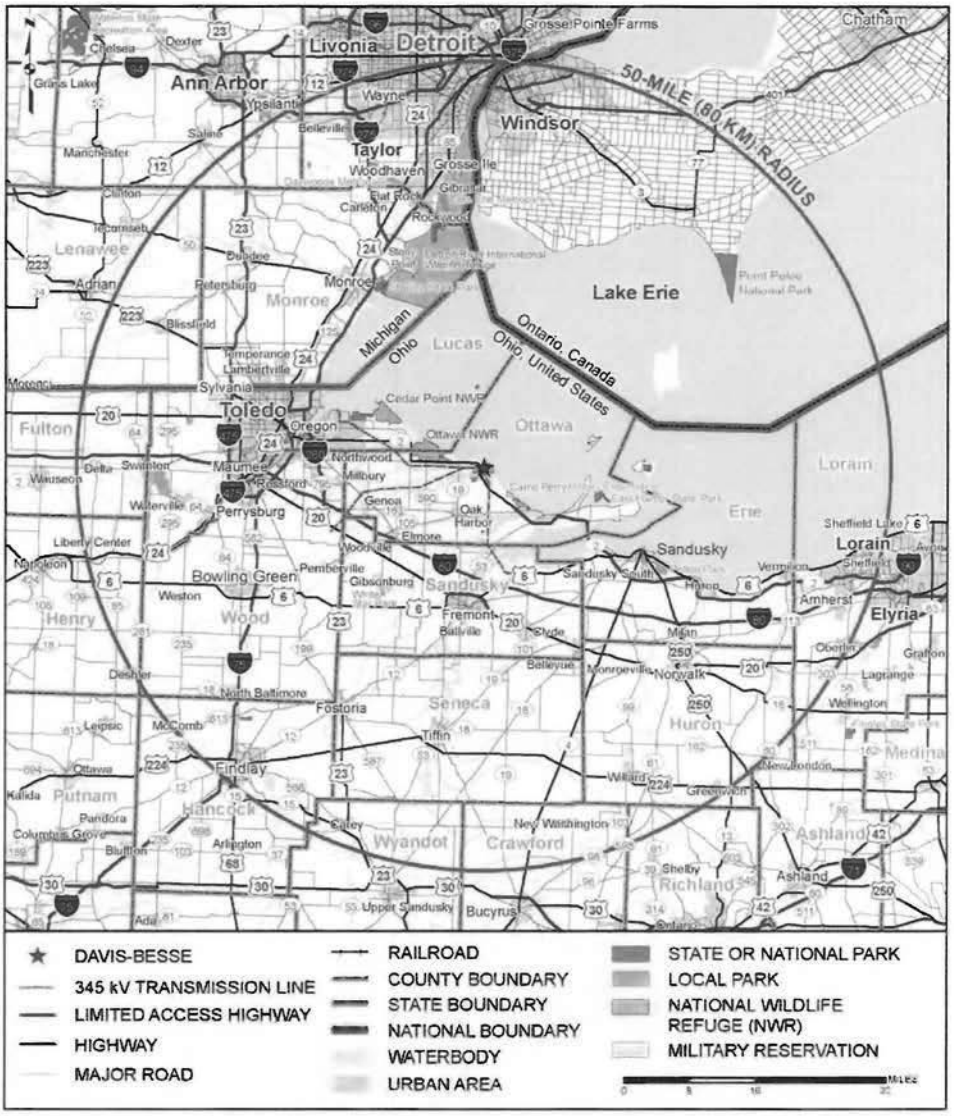
Sincerely,

David J Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

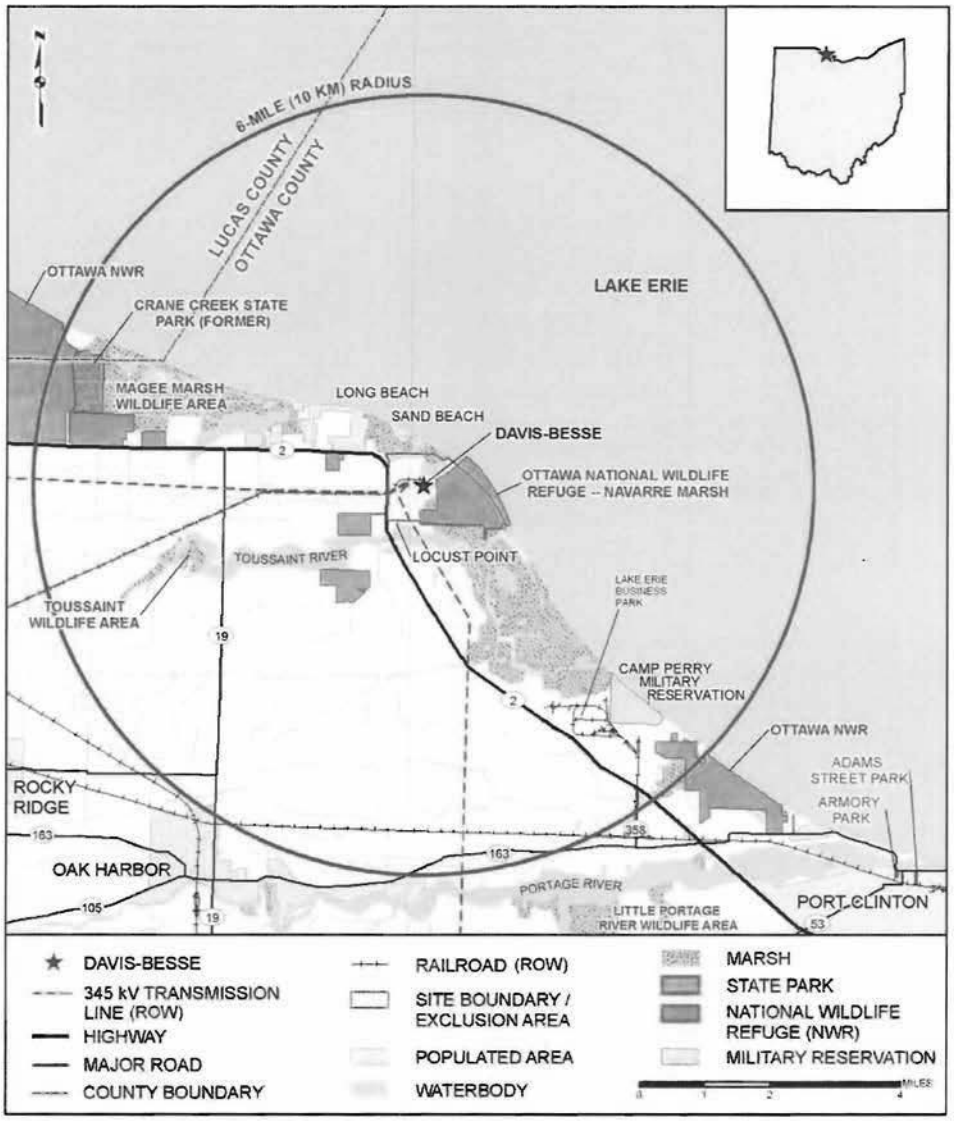
Docket No. 50-346

Enclosures:
1. Area Map, 50-mile radius
2. Area Map, 6-mile radius
3. Site Area Map
4. Transmission Line Map

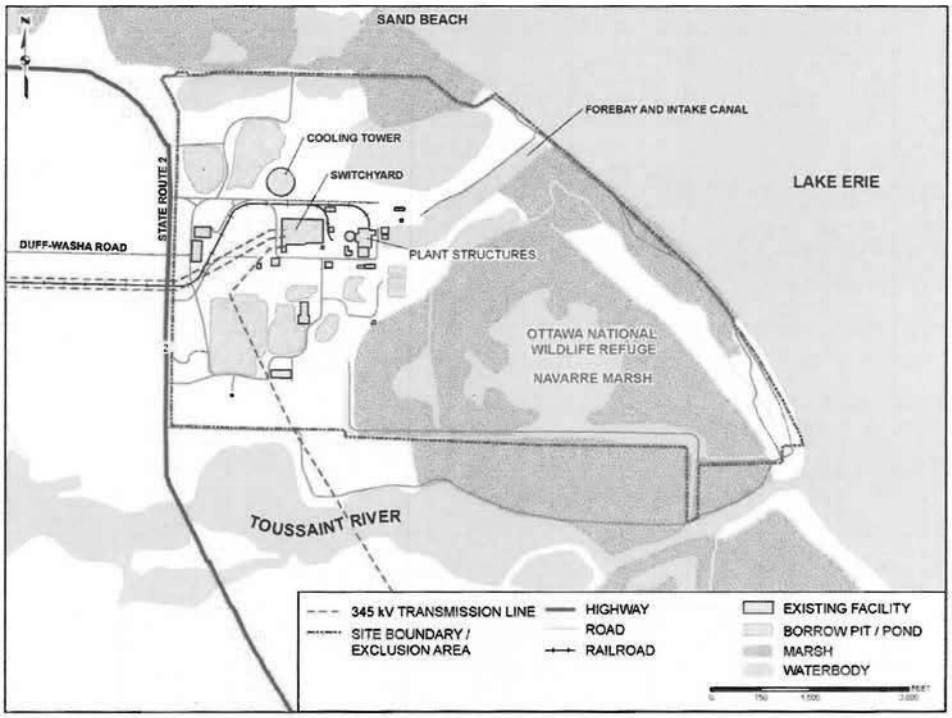
cc w/encls: Distribution via Listserv


50-MILE (80 KM) RADIUS
Lake Erie
Ontario, Canada
Ohio, United States
Michigan
Ohio
Detroit
Windsor
Toledo
Ann Arbor
Livonia
Taylor
Monroe
Lucas
Ottawa
Erie
Sandusky
Lorain
Elyria
Bowling Green
Fremont
Fostoria
Findlay
Tiffin
Norwalk
Huron
Seneca
Wood
Henry
Putnam
Hancock
Wyandot
Crawford
Richland
Ashland
Medina
Lenawee
Fulton
DAVIS-BESSE
345 kV TRANSMISSION LINE
LIMITED ACCESS HIGHWAY
HIGHWAY
MAJOR ROAD
RAILROAD
COUNTY BOUNDARY
STATE BOUNDARY
NATIONAL BOUNDARY
WATERBODY
URBAN AREA
STATE OR NATIONAL PARK
LOCAL PARK
NATIONAL WILDLIFE REFUGE (NWR)
MILITARY RESERVATION

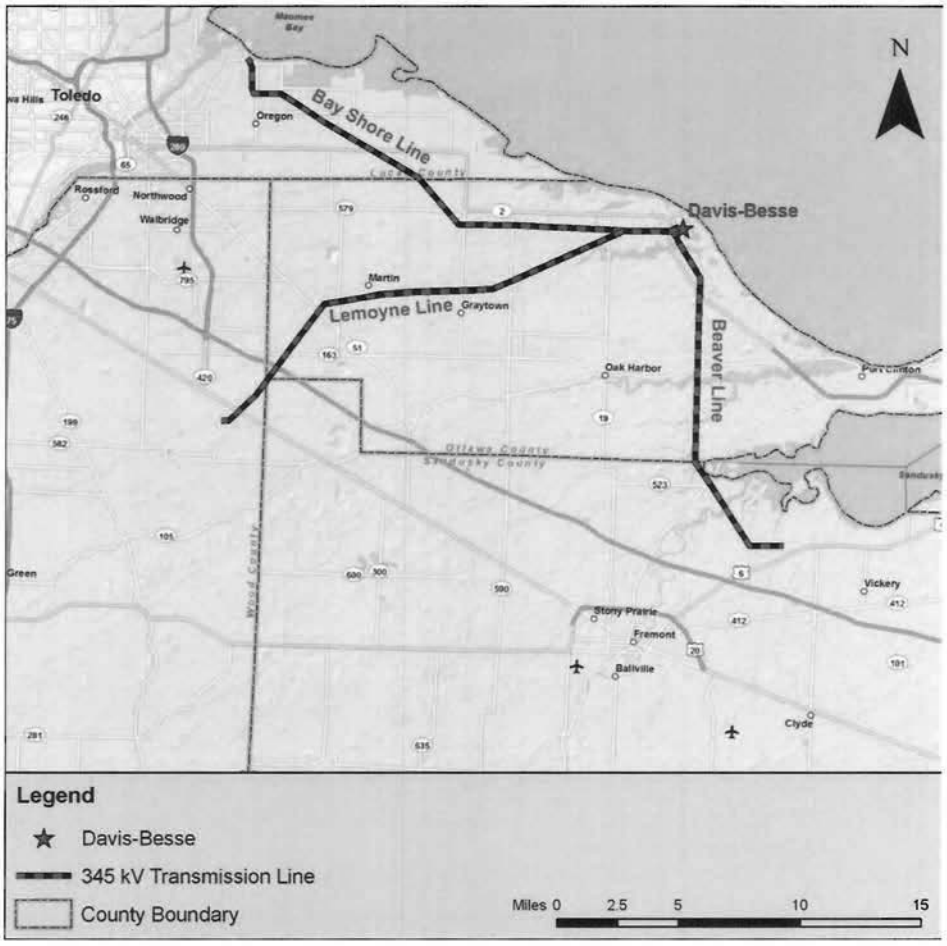
ENCLOSURE 1


6-MILE (10 KM) RADIUS
LUCAS COUNTY
OTTAWA COUNTY
OTTAWA NWR
CRANE CREEK STATE PARK (FORMER)
LAKE ERIE
MAGEE MARSH WILDLIFE AREA
LONG BEACH
SAND BEACH
DAVIS-BESSE
OTTAWA NATIONAL WILDLIFE REFUGE -- NAVARRE MARSH
TOUSSAINT RIVER
LOCUST POINT
LAKE ERIE BUSINESS PARK
TOUSSAINT WILDLIFE AREA
CAMP PERRY MILITARY RESERVATION
OTTAWA NWR
ADAMS STREET PARK
ARMORY PARK
ROCKY RIDGE
OAK HARBOR
PORTAGE RIVER
LITTLE PORTAGE RIVER WILDLIFE AREA
PORT CLINTON
DAVIS-BESSE
345 kV TRANSMISSION LINE (ROW)
HIGHWAY
MAJOR ROAD
COUNTY BOUNDARY
RAILROAD (ROW)
SITE BOUNDARY / EXCLUSION AREA
POPULATED AREA
WATERBODY
MARSH
STATE PARK
NATIONAL WILDLIFE REFUGE (NWR)
MILITARY RESERVATION
MILES

ENCLOSURE 2


N
S
SAND BEACH
FOREBAY AND INTAKE CANAL
COOLING TOWER
SWITCHYARD
LAKE ERIE
STATE ROUTE 2
DUFF-WASHA ROAD
PLANT STRUCTURES
OTTAWA NATIONAL
WILDLIFE REFUGE
NAVARRE MARSH
TOUSSAINT RIVER
345 kV TRANSMISSION LINE
SITE BOUNDARY /
EXCLUSION AREA
HIGHWAY
ROAD
RAILROAD
EXISTING FACILITY
BORROW PIT / POND
MARSH
WATERBODY

ENCLOSURE 3


N
Toledo
Oregon
Bay Shore Line
Lucas County
Rossford
Northwood
Walbridge
Davis-Besse
Martin
Lemoyne Line
Graytown
Oak Harbor
Beaver Line
Port Clinton
Ottawa County
Sandusky County
Wood County
Green
Vickery
Stony Prairie
Fremont
Ballville
Clyde
Legend
Davis-Besse
345 kV Transmission Line
County Boundary
Miles 0 2.5 5 10 15

ENCLOSURE 4

APPENDIX E
CHRONOLOGY OF ENVIRONMENTAL REVIEW CORRESPONDENCE

E CHRONOLOGY OF ENVIRONMENTAL REVIEW CORRESPONDENCE

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and external parties as part of its environmental review for Davis-Besse Nuclear Power Station, Unit 1. All documents, with the exception of those containing proprietary information are available electronically from the NRC's Public Electronic Reading Room found on the Internet at the following Web address: http://www.nrc.gov/reading-rm.html. From this site, the public can gain access to the NRC's Agencywide Documents Access and Management Systems (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for each document is included below.

August 27, 2010	Letter from Barry S. Allen, "Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, License Renewal Application and Ohio Coastal Management Program Consistency Certification" (ADAMS Accession No. ML1024505650)
September 14, 2010	Letter to Deborah Rossman, Director, Ida Rupp Public Library "Maintenance of Reference Materials at the Ida Rupp Public Library in Regards to the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application" (ADAMS Accession No. ML1024503420)
September 14, 2010	Letter to Mr. Clyde Scoles, Director, Toledo-Lucas County Public Library, "Maintenance of Reference Materials at the Toledo-Lucas County Public Library in Regards to the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application" (ADAMS Accession No. ML1024507070)
September 17, 2010	Letter to Barry S. Allen, Receipt and Availability of the License Renewal Application for the Davis-Besse Nuclear Power Station, Unit 1 (ADAMS Accession No. ML1023003250)
September 20, 2010	Press Release: NRC Announces Availability of License Renewal Application for Davis-Besse Nuclear Plant (ADAMS Accession No. ML102630380)
September 24, 2010	E-mail from Megan Seymore, Wildlife Biologist, U.S. Fish and Wildlife Service, to Richard Bulavinetz, NRC, titled Davis-Besse Transmission line corridor (ADAMS Accession No. 103630080)

October 12, 2010	Memorandum to David Wrona, NRC, from Andy Imboden, NRC, Acceptance of License Renewal Application, Davis-Besse Nuclear Power Station, Unit 1 (ADAMS Accession No. ML102850303)
October 18, 2010	Letter to Barry S. Allen, Determination of Acceptability and Sufficiency for Docketing, and Opportunity for a Hearing Regarding the Application from FirstEnergy Nuclear Operating Company, for renewal of the Operating License for the Davis-Besse Nuclear Power Station, Unit 1 (ADAMS Accession No. ML1027105840)
October 20, 2010	Letter to Barry S. Allen, "Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for License Renewal for the Davis-Besse Nuclear Power Station, Unit 1" (ADAMS Accession No. ML1027006031)
October 22, 2010	Memorandum to David J. Wrona, NRC, from Paula Cooper, NRC, and Brian Harris, NRC, Forthcoming Meeting to Discuss the License Renewal Process and Environmental Scoping for Davis-Besse Nuclear Power Station License Renewal Application Review (ADAMS Accession No. ML102870261)
October 26, 2010	Press Release: NRC Announces Opportunity for Hearing on Application to Renew Operating License For Davis-Besse Nuclear Power Plant (ADAMS Accession No. ML102990387)
October 28, 2010	Press Release: NRC to Conduct Environmental Scoping Meeting as Part of the License Renewal Application for Davis-Besse: Meeting November 4 (ADAMS Accession No. ML103010069)
November 4, 2010	Transcript Davis-Besse License Renewal Public Meeting—Afternoon Session, pages 1–46 (ADAMS Accession No. 110140231)
November 4, 2010	Transcript Davis-Besse License Renewal Public Meeting—Evening Session, pages 1–37 (ADAMS Accession No. 110140232)
November 22, 2010	Letter from NRC to Reid Nelson, Director, Advisory Council on Historic Preservation (ACHP) Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application Review (ADAMS Accession No. ML1029801401)

November 22, 2010	Letter to David Graham, Chief, Division of Wildlife, Ohio Department of Natural Resources (OHDNR), "Request for List of Protected Species Within the Area Under Evaluation for the Davis-Besse Nuclear Power Station License Renewal Application Review" (ADAMS Accession No. ML102980688)
November 23, 2010	Letter to Brian Mitch, Environmental Review Manager, OHDNR, "Request for List of Protected Species Within the Area Under Evaluation for the Davis-Besse Nuclear Power Station License Renewal Application Review" (ADAMS Accession No. ML102980430)
November 23, 2010	Letter to Edgar L, French, Delaware Nation, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
November 23, 2010	Letter to Harold G. Frank, Forest County Potawatomi Community, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
November 23, 2010	Letter to Kenneth Meshiguad, Hannahville Indian Community Council, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
November 23, 2010	Letter to Floyd E. Leonard, Miami Tribe of Oklahoma, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
November 23, 2010	Letter to Ron Sparkman, Shawnee Tribe, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
November 23, 2010	Letter to Leaford Bearskin, Wyandotte Nation, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)

November 23, 2010	Letter to John P. Froman, Peoria Tribe of Indians of Oklahoma, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
November 23, 2010	Letter to Charles Todd, Ottawa Tribe of Oklahoma, "Request for Scoping Comments Concerning the Davis-Besse Nuclear Power Plant, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1030001644)
December 6, 2010	Letter from NRC to Patricia Kurkul, National Oceanic and Atmospheric Administration Fisheries Service (NOAA), "Request for List of Protected Species Within the Area Under Evaluation for the Davis-Besse Nuclear Power Station License Renewal Application Review" (ADAMS Accession No. ML1029806923)
December 7, 2010	Letter from NRC to Mark Epstein, Ohio State Historic Preservation Officer, "Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application Review" (ADAMS Accession No. ML1029806874)
December 11, 2010	Video Recording of Public Comments on the NRC Relicensing of the Davis-Besse Nuclear Plant in Columbus, Ohio (ADAMS Accession No. ML11348A013)
December 16, 2010	Letter from Mary Knapp, United States Department of the Interior, Fish and Wildlife Services, "Docket ID NRD-2010-0298" (ADAMS Accession No. ML1100602894)
December 18, 2010	Transcript and Video Recording of the People's Hearing on Davis-Besse Relicensing (ADAMS Accession No. ML 11209C0801)
December 21, 2010	Letter from Mary A. Colligan, NOAA, "Re: Davis-Besse Nuclear Power Station" (ADAMS Accession No. ML1101402300)
December 28, 2010	Letter to Barry S. Allen, "Schedule for the Conduct of Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application" (ADAMS Accession No. ML1034305800)
February 2, 2011	E-mail to Laura Bonneau, FWS, "Educational Program" (ADAMS Accession No. ML11236A085)

February 9, 2011	E-mail from Laura Bonneau, FWS, “Educational Program” (ADAMS Accession No. ML11235A564)
February 10, 2011	E-mail to Laura Bonneau, FWS, “Educational Program” (ADAMS Accession No. ML11236A083)
February 10, 2011	E-mail from Laura Bonneau, FWS, “Educational Program” (ADAMS Accession No. ML11235A558)
February 15, 2011	E-mail to Mary Knapp, FWS, for invitation to the license renewal environmental audit (ADAMS Accession No. ML11236A075)
February 15, 2011	E-mail from Mary Knapp, FWS, in response to audit invitation (ADAMS Accession No. ML11235A748)
February 15, 2011	E-mail to Brain Mitch, OHDNR, for invitation to the License renewal environmental audit (ADAMS Accession No. ML11236A077)
February 15, 2011	E-mail to Dave Snyder, OHPO, for invitation to the license renewal environmental audit (ADAMS Accession No. ML11236A079)
February 23, 2011	Letter to Barry S. Allen, “Requests for Additional Information (RAIs) for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application (ADAMS Accession No. ML1101304942)
February 28, 2011	Letter to Barry S. Allen, “Environmental Site Audit Regarding Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (ADAMS Accession No. ML1101901132)
March 4, 2011	E-mail to Mary Knapp, FWS, to provide environmental audit schedule (ADAMS Accession No. ML11236A069)
March 4, 2011	E-mail to Mark Epstein, OHPO, for invitation to the license renewal environmental audit (ADAMS Accession No. ML11236A071)
March 4, 2011	E-mail from Dave Snyder, OHPO, in response to audit invitation (ADAMS Accession No. ML11236A071)

March 4, 2011	E-mail to Dave Snyder, OHPO, for scheduling of Audit telephone conference (ADAMS Accession No. ML11236A073)
March 8, 2011	E-mail from Laura Bonneau, FWS, for confirmation of audit activities (ADAMS Accession No. ML11235A556)
March 8, 2011	E-mail to Dave Snyder, OHPO, to provide audit-related conference call information (ADAMS Accession No. ML11236A067)
March 9, 2011	E-mail to Laura Bonneau, FWS, to provide audit-related conference call information and scheduling (ADAMS Accession No. ML11236A065)
March 14, 2011	E-mail to Megan Seymour, FWS, to provide update on transmission line mapping (ADAMS Accession No. ML 1107303280)
March 23, 2011	Letter from Barry S. Allen, “Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346. License Number NPF-3, Reply to RAI for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (TAC No. ME4640) (ADAMS Accession No. ML1108800582)
May 27, 2011	RAI responses from applicant, “Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, Reply to RAIs for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (TAC No. ME4613) Environmental Report (ADAMS Accession No. ML11193A093)
April 20, 2011	Letter to Barry S. Allen, “RAI for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (ADAMS Accession No. ML1109105664)
April 26, 2011	Letter to Barry S. Allen, “RAI for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (ADAMS Accession No. ML11094A0993)
June 1, 2011	Letter to Mary Knapp, FWS, “Request for Lost of Federally Protected Species and Important Habitats within the Area Under Evaluation for the Davis-Besse Nuclear Power Station License Renewal Application Review” (ADAMS Accession No. ML11131A1765)

June 3, 2011	Summary of site audit to support review of LRA of Davis-Besse Nuclear Power Station, Unit 1 (ADAMS Accession No. ML1108202760)
July 11, 2011	Letter from Kendall W. Byrd, Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, Ohio Department of Natural Resources Office of Coastal Management Concurrence with Federal Consistency Certification Related to the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application Environmental Report (TAC No. ME4613) (ADAMS Accession No. ML11195A1460)
June 24, 2011	Letter from Kendall W. Byrd, Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, Reply to RAI for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application (TAC No. ME4613) Environmental Report Severe Accident Mitigation Alternatives Analysis and License Renewal Application Amendment No.1 (ADAMS Accession No. ML11180A233)
July 11, 2011	Letter from Kendall W. Byrd, Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, Ohio Department of Natural Resources, Office of Coastal Management Concurrence with Federal Consistency Certification Related to the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application Environmental Report (TAC No. ME4613) (ADAMS Accession No. ML11195A146)
August 1, 2011	Summary of scoping meeting held in support of the environmental review for the Davis-Besse Nuclear Power Station, Unit 1, LRA (ADAMS Accession No. ML11173A200)
August 15, 2011	Memorandum from John Parillo, NRC, to Travis L. Tate, Branch Chief, NRC, “RAI Response Clarifications from Davis-Besse Nuclear Power Station in Support of License Renewal Application” (TAC No. ME4613) (ADAMS Accession No. ML112270139)
August 31, 2011	Memorandum from Travis L. Tate, Branch Chief, NRC, to David J. Wrona, Branch Chief, NRC, “Evaluation of Severe Accident Mitigation Alternatives for Davis-Besse Nuclear Power Station” (TAC No. ME4613) (ADAMS Accession No. ML112300844)

September 1, 2011	Letter from Barry S. Allen, Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, Reply to Supplemental RAI for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application (TAC No. ME4613) Environmental Report Severe Accident Mitigation Alternatives Analysis (ADAMS Accession No. ML11250A0680)
September 19, 2011	Letter from Kendall W. Byrd, Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, License Renewal Application Amendment No. 16, Supplemental Information for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application Environmental Report (TAC No. ME4613) (ADAMS Accession No. ML11266A0620)
September 19, 2011	Letter from Kendall W. Byrd, Davis-Besse Nuclear Power Station, Unit 1, Docket No. 50-346, License Number NPF-3, License Renewal Application Amendment No. 17, Supplemental Information for the Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application Environmental Report (TAC No. ME4613) (ADAMS Accession No. ML11266A0090)
October 31, 2011	Letter to Barry S. Allen, “Schedule Revision for the Environmental and Safety Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (ADAMS Accession No. ML11256A164)
July 31, 2013	Letter to Barry S. Allen, “Schedule Revision for the Environmental and Safety Review of the Davis-Besse Nuclear Power Station, Unit 1, License Renewal Application” (ADAMS Accession No. ML13205A036)

APPENDIX F
U.S. NUCLEAR REGULATORY COMMISSION STAFF EVALUATION OF SEVERE ACCIDENT MITIGATION ALTERNATIVES FOR DAVIS-BESSE NUCLEAR POWER STATION IN SUPPORT OF LICENSE RENEWAL APPLICATION REVIEW

F U.S. NUCLEAR REGULATORY COMMISSION STAFF EVALUATION OF SEVERE ACCIDENT MITIGATION ALTERNATIVES FOR DAVIS-BESSE NUCLEAR POWER STATION IN SUPPORT OF LICENSE RENEWAL APPLICATION REVIEW

F.1 Introduction

FirstEnergy Nuclear Operating Company (FENOC), on behalf of FirstEnergy Nuclear Generation Corporation, submitted to the U.S. Nuclear Regulatory Commission (NRC) an assessment of severe accident mitigation alternatives (SAMAs) for the Davis-Besse Nuclear Power Station, Unit 1 (Davis-Besse) as part of the Environmental Report (ER) (FENOC 2010). This assessment was based on the most recent Davis-Besse probabilistic risk assessment (PRA) available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) computer code (NRC 1998a), and insights from the Davis-Besse individual plant examination (IPE) (Centerior Energy 1993) and individual plant examination of external events (IPEEE) (Centerior Energy 1996). In identifying and evaluating potential SAMAs, FENOC considered SAMA candidates that addressed the major contributors to core damage frequency (CDF) and large early release frequency (LERF) at Davis-Besse, as well as SAMA candidates for other operating plants that have submitted license renewal applications (LRAs). FENOC identified 167 potential SAMA candidates. The SAMA candidates were reduced to 15 by eliminating SAMAs that are not applicable for one or more of the following reasons:

- The SAMA has design differences or has already been implemented at Davis-Besse.
- The SAMA is not applicable to Davis-Besse.
- The SAMA has estimated implementation costs that would exceed the dollar value associated with eliminating all severe accident risk at Davis-Besse.
- The SAMA is related to a non-risk significant system and, therefore, has a very low benefit.
- The SAMA is similar in nature and could be combined with another SAMA candidate.

FENOC assessed the costs and benefits associated with each of these 15 potential SAMAs and concluded in the ER that one of the candidate SAMAs evaluated is potentially cost-beneficial.

Based on a review of the SAMA assessment, the NRC issued a request for additional information (RAI) to FENOC by letter dated April 20, 2011 (NRC 2011a). Key questions concerned the following:

- additional details regarding the plant-specific PRA model and changes to CDF and LERF since the IPE,
- additional information on the internal and external reviews of the PRA model performed since the IPE,
- the process used to map Level 1 PRA results into the Level 2 analysis and group containment event tree (CET) end states into release categories,
- justification for the multiplier used for external events,
- population assumptions used in the Level 3 analysis,

- the use of importance analysis in identifying plant-specific SAMA candidates, and
- further information on the cost-benefit analysis of several specific candidate SAMAs and low-cost alternatives.

FENOC submitted additional information to the NRC by letter dated June 24, 2011 (FENOC 2011). FENOC also provided clarifications to the RAI responses via e-mail on July 18 and July 27, 2011 (NRC 2011b). In response to the RAIs, FENOC provided the following information:

- identification of key factors for a significant change in CDF associated with particular version of the Davis-Besse PRA model,
- clarification of the scope of the peer reviews and the status of peer review findings,
- description of the process for mapping Level 1 results into the Level 2 analysis and for assigning CET sequences to release categories,
- a revised SAMA analysis reflecting a higher maximum benefit, higher external events multiplier, and the 95th percentile CDF,
- clarification of the sensitivity analysis,
- an assessment of SAMAs previously found to be potentially cost beneficial for Babcock and Wilcox (B&W) plants,
- additional rationale for not identifying SAMAs for many of the basic events on the risk importance lists,
- additional rationale for considering SAMAs related to improved procedures or training or automated functions that would eliminate high risk operator error,
- an assessment of SAMAs subsumed by other more costly SAMAs, and
- additional information regarding several specific SAMAs.

Subsequent to the RAI responses, FENOC submitted a supplement to the ER that corrected the following five errors in the SAMA assessment (FENOC 2012a):

(1) An inaccurate land area conversion factor for acres to hectares was used.

(2) Dollar values for Ohio farmland and non-farmland were selected from Ohio Department of Taxation ‘tax assessment’ values instead of ‘appraised’ values.

(3) The escalation of decontamination costs was not performed in accordance with approved guidance.

(4) Core inventory isotopic ‘activity’ was used instead of isotopic ‘mass’ in the Modular Accident Analysis Program (MAAP) software code runs in contrast to updated industry guidance.

(5) The wind direction from the Davis-Besse Meteorological Tower was not converted from the ‘blowing from’ direction to the ‘blowing toward’ direction for use in the SAMA Analysis calculations.

Based on a review of this updated SAMA assessment, the NRC held a conference call with FENOC on September 25, 2012, to clarify the decontamination cost escalation factor used in the assessment and the updated release category results (FENOC 2012b).

FENOC's response to the RAIs, as well as FENOC's response to the ER supplement clarification questions, addressed all the concerns raised by the NRC staff.

An assessment of SAMAs for Davis-Besse is presented below.

F.2 Estimate of Risk for Davis-Besse

FENOC's estimates of offsite risk at Davis-Besse are summarized in Section F.2.1. The summary is followed by the NRC staff's review of FENOC's risk estimates in Section F.2.2.

F.2.1 FENOC's Risk Estimates

Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA analysis; the Davis-Besse Level 1 and 2 PRA model, which is an updated version of the IPE (Centerior Energy 1993), and a supplemental analysis of offsite consequences and economic impacts (essentially a Level 3 PRA model) developed specifically for the SAMA analysis. The SAMA analysis is based on the most recent Davis-Besse Level 1 and Level 2 PRA model available at the time of the ER, which is referred to as "SAMA Analysis Model," and is a special update of the Davis-Besse Revision 4 PRA to support the SAMA evaluation. The scope of this Davis-Besse PRA does not include external events.

The Davis-Besse CDF is approximately 9.8×10^{-6} per year for internal events using a truncation value of 5×10^{-13} per year. This CDF includes contributions from internal flooding and high winds (not including tornado-generated missiles). When determined from the sum of the CET sequences, or Level 2 model, the release frequency (from all release categories including intact containment, early and late releases) is approximately 1.0×10^{-5} per year using a truncation value of 5×10^{-13} per year. The latter value was used as the baseline CDF in the SAMA evaluations. The CDF is based on the risk assessment for internally initiated events, which includes internal flooding. FENOC did not explicitly include the contribution from external events in the Davis-Besse PRA risk estimates; however, it did account for the potential risk reduction benefits associated with external events by multiplying the estimated benefits for internal events by a factor of 3.0. As a result of NRC review, FENOC revised the external events multiplier to a factor of 4.6. This is discussed further in Sections F.2.2 and F.6.2.

The breakdown of CDF by initiating event is provided in Table F-1. As shown in this table, loss of offsite power (LOOP), loss of component cooling water (CCW), and reactor or turbine trips are the dominant contributors to the CDF. Anticipated transient without scram (ATWS) sequences are modeled as a failure to trip after an initiating event; ATWS sequences contribute approximately 1 percent to CDF. Station Black Out (SBO) sequences involve a LOOP (as the initiating event or following an initiating event), along with subsequent failure of power to both safety buses, (i.e., a loss of both emergency diesel generators (EDGs) and the SBO diesel generator); SBO sequences contribute approximately 5 percent to CDF and are dominated by sequences initiated by a LOOP.

The Level 2 PRA model that forms the basis for the SAMA evaluation represents a complete revision of the original IPE Level 2 model. The current Level 2 model uses a single CET containing both phenomenological and systemic events. The Level 1 core damage sequences are grouped into core damage bins according to similarities in their impact on containment response. The core damage bins, together with the states of containment systems comprise the plant damage states (PDSs), which provide the interface between the Level 1 analysis and Level 2 CET analysis. The CET probabilistically evaluates the progression of the damaged core

with respect to release to the environment. CET nodes are evaluated using supporting fault trees and logic rules. The CET end states are then examined for considerations of timing and magnitude of release and assigned to release categories.

The result of the Level 2 PRA is a set of 34 specific release categories, also referred to as source term categories, with their respective frequency and release characteristics. The results of this analysis for Davis-Besse are provided in Table E.3-13 of Appendix E to the ER (FENOC 2010). The frequency of each release category was obtained by summing the frequency of the individual accident progression CET endpoints assigned to each release category. Source terms were developed for each of the 34 release categories using the results of Modular Accident Analysis Program (MAAP) Version 4.0.6 computer code calculations based on characteristics that determine the timing and magnitude of the release, whether or not the containment remains intact, and isotopic composition of the release material (FENOC 2010).

The offsite consequences and economic impact analyses use the MACCS2 code to determine the offsite risk impacts on the surrounding environment and public. Inputs for these analyses include plant-specific and site-specific input values for core radionuclide inventory, source term and release characteristics, site meteorological data, projected population distribution within a 50-mi (80-km) radius for the year 2040, emergency response evacuation planning, and economic parameters. The core radionuclide inventory corresponds to the end-of-cycle values for Davis-Besse operating at 2,827 megawatt thermal (MWt), which bounds the currently approved power level. The magnitude of the onsite impacts (in terms of cleanup and decontamination costs and occupational dose) is based on information provided in NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook" (NRC 1997a).

Table F-1. Davis-Besse Core Damage Frequency for Internal Events

Initiating Event[(a)]	CDF (per year)(d)	% Contribution to CDF(d)
LOOP	1.9×10^{-6}	19
Loss of CCW pump(s)	1.7×10^{-6}	18
Reactor or turbine trip	1.3×10^{-6}	13
Steam generator tube rupture (SGTR)	6.2×10^{-7}	6
Loss of main feedwater	5.7×10^{-7}	6
Main feedwater flow control[(b)]	5.1×10^{-7}	5
Reactor vessel (RV) rupture	5.0×10^{-7}	5
Small loss-of-coolant accident (LOCA)	4.3×10^{-7}	4
Flooding in CCW pump room	2.0×10^{-7}	2
Medium LOCA	1.5×10^{-7}	2
Loss of service water pump room ventilation	1.3×10^{-7}	1
Loss of direct current (DC) power from Bus d2p	1.1×10^{-7}	1
Flooding in turbine building	8.8×10^{-8}	1
Loss of non-nuclear instrumentation cabinets 1–4 (NNIX) DC power supply	8.2×10^{-8}	1

Initiating Event[(a)]	CDF (per year)(d)	% Contribution to CDF(d)
Other[(c)]	1.5×10^{-6}	15
Total CDF (internal events)	9.8×10^{-6}	100

(a) This table is based on model quantification using 5×10^{-13} per year truncation.

(b) In response to an NRC staff RAI, FENOC explains that T2A-1 and T2B-1 are main feedwater flow control valve initiators, and T2A-2 and T2B-2 are the associated flow controller initiators. These four initiators combined form the main feedwater flow control initiator (FENOC 2011).

(c) This is calculated from information in ER Table E.3-1.

(d) Column totals may be different due to round off.

In response to an NRC staff RAI, FENOC estimated the dose to the population within 50 mi (80 km) of the Davis-Besse site to be approximately 0.0212 person-Sievert (Sv) (2.12 person-rem) per year (FENOC 2012a). The breakdown of the total population dose by containment release mode is summarized in Table F-2. SGTR and interfacing system LOCA (ISLOCA), both containment bypass events, dominate the population dose risk at Davis-Besse.

Table F-2. Breakdown of Population Dose by Containment Release Mode

Containment release mode[(a,b)]	Population Dose (person-rem[(c,d)] per year)	% Contribution [(d)]
SGT	1.35	64
ISLOCA	0.35	17
Large containment isolation failure	0.02	1
Small containment isolation failure	0.06	3
Large early release	0.03	1
Sidewall failure (early)	0.03	1
Late containment failure	0.06	3
Basemat failure	0.21	10
No containment failure	0.02	1
Total	**2.12**	**100**

(a) This table is based on model quantification using 5×10^{-13} per year truncation.

(b) Estimated population doses calculated from revised information provided in Table E.3-21 of response to NRC staff RAI 4.b (FENOC 2011).

(c) One person-rem = 0.01 person-Sv.

(d)Column totals may be different due to round off

F.2.2 Review of FENOC's Risk Estimates

FENOC's determination of offsite risk at Davis-Besse is based on the following major elements of analysis:

- the Level 1 and 2 risk models that form the bases for the 1993 IPE submittal (Centerior Energy 1993) and the external event analyses of the 1996 IPEEE submittal (Centerior Energy 1996);

- the major modifications to the IPE model that have been incorporated in the Davis-Besse PRA, including a complete revision of the Level 2 risk model; and
- the MACCS2 analyses performed to translate fission product source terms and release frequencies from the Level 2 PRA model into offsite consequence measures.

Each of these analyses was reviewed to determine the acceptability of the Davis-Besse risk estimates for the SAMA analysis, as summarized below.

The NRC staff's review of the Davis-Besse IPE is described in a safety evaluation report (SER) (NRC 1996). Based on the review of the original IPE submittal and responses to RAIs, the NRC staff concluded that the IPE submittal met the intent of generic letter (GL) 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities" (NRC 1988); that is, the applicant's IPE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities. Although no vulnerabilities were identified in the IPE, 11 improvements to the plant or procedures were identified. These improvements have been either implemented at the site or included in the SAMA evaluation process (FENOC 2010). These improvements are discussed in Section F.3.2.

There have been five revisions to the IPE model between the 1993 IPE submittal and the model used for the SAMA analysis. A listing of the major changes in each revision of the PRA was provided by FENOC in Section E.3.1.1.2 of the ER (FENOC 2010) and in response to an NRC staff RAI (FENOC 2011). The revisions to the IPE are summarized in Table F-3. FENOC clarified that the large decrease in CDF between Revision 0 and Revision 1 is primarily due to reduction in transient frequencies for reactor or turbine trips and loss of main feedwater. Additionally, the sizeable decrease between Revision 3 and Revision 4 was primarily due to update of data and an increase in the time operators have to trip the reactor cooling pumps following loss of seal cooling. A comparison of the internal events CDF between the 1993 IPE and the SAMA analysis model indicates a decrease of approximately 85 percent (from 6.6×10^{-5} per year to 9.8×10^{-6} per year).

The CDF value from the 1993 Davis-Besse IPE (6.6×10^{-5} per year) is near the higher end of the range of the CDF values reported in the IPEs for B&W plants. Figure 11.6 of NUREG-1560 shows that the IPE-based internal events CDF for these plants range from about 1×10^{-5} per year to 7×10^{-5} per year, with an average CDF for the group of 3×10^{-5} per year (NRC 1997b). It is recognized that other plants have updated the values for CDF subsequent to the IPE submittals to reflect modeling and hardware changes. The internal events CDF result for Davis-Besse used for the SAMA analysis (9.8×10^{-6} per year, including internal flooding) is comparable to that for other plants of similar vintage and characteristics.

The NRC staff considered the peer reviews performed for the Davis-Besse PRA and the potential impact of the review findings on the SAMA evaluation. In the ER (FENOC 2010) and in response to an NRC staff RAI (FENOC 2011), FENOC describes a B&W owner's group peer review performed from 1999 through 2000 on internal events and LERF and a "gap self assessment" performed by a team of industry peers and internal staff using the 2005 American Society of Mechanical Engineers (ASME) PRA standard (ASME 2005). The owner's group peer review identified no Level A (important and necessary to address before the next regular PRA update) and 18 Level B (important and necessary to address, but disposition may be deferred until the next PRA update) facts and observations (F&Os). FENOC clarifies that 13 of these open findings were closed prior to implementation of the mitigating systems performance index (MSPI) document, four were closed in the SAMA analysis model, and the remaining F&O is

essentially addressed by the SAMA evaluation. This last finding recommended additional sensitivity studies be performed to study the sensitivity of results to modeling PRA assumptions.

The SAMA evaluation includes an importance analysis of basic and initiating events as well as a Level 3 parameter sensitivity analysis, and, in response to an NRC staff RAI, FENOC provided the results of an uncertainty analysis (further discussed in Section F.6.1). Therefore, further insights gained from an additional sensitivity analysis would not be expected to yield significant new insights. FENOC explained in the ER and in an RAI response that the gap self-assessment covered Level 1 and LERF elements excluding internal flooding and high winds, and that it focused on identifying gaps to meeting Capability Category II of the ASME PRA standard (ASME 2005). There were four Level A findings and 23 Level B findings from this gap self-assessment. FENOC summarized these findings, and the model changes made to address the findings in Section E.3.1.1.2 of the ER (FENOC 2010), and stated in the RAI response that all of the Level A and B findings are addressed in the SAMA analysis model.

Table F-3. Davis-Besse Probabilistic Risk Assessment Historical Summary

PRA Version	Summary of Changes From Prior Model	CDF (per year)
1993	IPE Submittal	6.6×10^{-5}
Revision 0 Revision 1 Revision 2 1999	• Performed plant-specific update of failure rates, unavailability, common cause, initiating event frequency, and human reliability analysis (HRA) • Made modifications to reflect plant and procedure changes including adding the SBO diesel generator (DG), removal of a startup feed pump, improvements to CCW and service water system modeling, update of SGTR emergency response modeling, and internal flooding modeling • Improved model documentation to comply with draft PRA standard requirements	$1.4x10^{-5}$ $1.6x10^{-5}$ $1.7x10^{-5}$
Revision 3 5/2001	• Added explicit LERF model • Addressed all Level B peer review findings • Improved model quantification logistics including reducing truncation limit to $2.0x10^{-10}$ • Deleted ISLOCA sequence judged not credible and RV rupture as negligible • Added conditional probability that reactor will trip due to loss of 4160 Volt Bus C or D • Revised logic for loss of start-up feedwater due to circulating water flooding • Revised success criteria for large and medium LOCAs to one of two core flood tanks • Improved model documentation to comply with draft PRA standard requirements	$1.3x10^{-5}$
Revision 4 9/2007	• Updated model for new PRA software • Increased available response time following loss of CCW for manual tripping of Reactor Coolant Pumps (RCPs) from 10 minutes to 1 hour • Added tornado initiating events, excluding consideration of missile generation • Performed module management changes • Reduced truncation limit to $5.0x10^{-13}$	$4.7x10^{-6}$
SAMA analysis	• Reviewed and updated all system fault trees for system dependencies	$9.8x10^{-6}$

PRA Version	Summary of Changes From Prior Model	CDF (per year)
model	• Added RV rupture initiating event	
7/2009	• Changed success criteria in case of a large LOCA back to two core flood tanks	
	• Made model improvements to CCW and service water models to correct errors	
	• Adjusted system fault trees to and reflect simultaneous alignments using split fraction	
	• Revised common cause failure modeling to use of multiple greek letter approach	
	• Updated HRA using Electric Power Institute (EPRI) HRA calculator	
	• Structured support system initiating event modeling to comply with EPRI guidance (EPRI 2006)	
	• Removed modules from fault trees	
	• Added fire modeling functionality in preparation for performing a National Fire Protection Association (NFPA) 805 analysis	
	• Improved modeling with respect to success gates and mutually exclusive terms	
	• Adapted a two-step quantification approach to facilitate incorporation of recovery events	

In response to an NRC staff RAI (FENOC 2011), FENOC describes the quality control process used at Davis-Besse for the development and maintenance of the PRA. An operating manual related to the PRA Program and a business practice document related to PRA model management both identify requirements for maintaining and updating the PRA models and applications in accordance with regulatory guide (RG) 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (NRC 2007) and ensure that the PRA models are current with the changes to the plant. These control documents cover updates; identifying, tracking, and disposition of plant changes; personnel qualification; self-assessment; PRA software and computer control including software quality assurance; and PRA records and documentation. The NRC staff considers FENOC's quality control process to be of sufficient quality to support the SAMA evaluation.

The NRC staff asked FENOC to identify any changes to the plant, including physical and procedural modifications, since the July 2009 SAMA analysis model that could have a significant impact on the results of the SAMA analysis (NRC 2011a). In response to the RAI, FENOC stated that while there have been some plant changes since the SAMA analysis model, no changes have been identified that would have a significant impact on the SAMA evaluation (FENOC 2011). Furthermore, FENOC states that plant procedures for managing the PRA model specify that plant changes are to be evaluated to determine if they would cause a change of greater than 10 percent CDF, or greater than 20 percent LERF; there have been no changes that meet these criteria.

Given that the Davis-Besse internal events PRA model has been peer-reviewed and the peer review findings were all addressed, and that FENOC has satisfactorily addressed NRC staff questions regarding the PRA, the NRC staff concludes that the internal events Level 1 PRA model is of sufficient quality to support the SAMA evaluation.

As indicated above, the current Davis-Besse PRA does not include external events. In the absence of such an analysis, FENOC used the Davis-Besse IPEEE to identify the highest risk accident sequences and the potential means of reducing the risk posed by those sequences, as discussed below and in Section F.3.2.

FENOC submitted the Davis-Besse IPEEE in February 1996 (Centerior Energy 1996) in response to Supplement 4 of GL 88-20 (NRC 1991). This submittal included a seismic margins analysis, an internal fire PRA, and an evaluation of high winds, external flooding, and other hazards. While no fundamental weaknesses or vulnerabilities to severe accident risk in regard to the external events were identified, a limited set of plant improvements based on an external events finding was identified and is discussed below. In a letter dated February 8, 2001, the NRC staff concluded that the submittal met the intent of Supplement 4 to GL 88-20, and the applicant's IPEEE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities (NRC 2001).

The seismic portion of the IPEEE consisted of a reduced-scope seismic evaluation using the EPRI methodology (EPRI 1991) for seismic margins assessment (SMA), with enhancements specified in NUREG-1407 (NRC 1991), in conjunction with the Seismic Qualification User's Group (SQUG) methodology (SQUG 1992). This method is qualitative and does not provide numerical estimates of the CDF contributions from seismic initiators (EPRI 1991). FENOC indicates in the ER that the SMA has not been updated since the IPEEE. Although the size of an earthquake is usually reported in terms of Richter magnitude, ground-shaking forces are most commonly reported in units of acceleration as a fraction of the force (acceleration) of gravity (g). For the IPEEE seismic assessment, Davis-Besse was categorized as a 0.3 g focused-scope plant per NUREG-1407; however, the applicant performed a 0.15 g reduced scope SMA based on a perceived lower seismic risk at Davis-Besse. The applicant judged seismic risk to be lower at Davis-Besse based on its review of revised Lawrence Livermore National Laboratory (LLNL) seismic hazard curves (NRC 1994a), its review of information notice (IN) 94-32, "Revised Seismic Hazard Estimates" (NRC 1994b), and its commitment to address the outliers identified by the walkdowns for the Unresolved Safety Issue (USI) A-46 Program. The SMA determined that the lowest high confidence in low probability of failure (HCLPF) value for the components evaluated was 0.26 g. In the letter dated February 8, 2001, the NRC staff concluded that the applicant came close to meeting the objectives of a focused scope analysis (NRC 2001).

The NRC staff asked about whether plant improvements had been made to the five structures and components, four masonry walls, and borated water storage tank (BWST) roof determined to have an HCLPF value of less than 0.3 g in the IPEEE (NRC 2011a). In response to the RAI, FENOC stated that plant improvements had been performed for the four components involving masonry walls and that no modifications have been made to the BWST roof. Updated analyses were performed to ensure allowable stresses and design-basis requirements for masonry structures were met (FENOC 2011). In a followup clarification to the RAI responses, FENOC further explained that a SAMA candidate already identified and evaluated in the ER meets the intent of improving the seismic capacity of the BWST roof. This is further discussed in Section F.3.2.

The Davis-Besse IPEEE seismic evaluation identified one unresolved outlier remaining from implementation of the USI A-46 Program. The one unresolved outlier was the identification of two flammable compressed gas bottles with inadequate seismic mounting. This is further discussed in Section F.3.2. The USI A-46 SER for Davis-Besse indicates that the license completed the resolution of all outliers (NRC 2000).

To provide additional insight into the appropriate seismic CDF to use for the SAMA evaluation, the NRC staff used NRC information notice (IN) 2010-18, generic issue 199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on existing Plants," which informs applicants that updated seismic data and models show increased seismic hazard estimates for some plants. The NRC report cited in the IN estimates of the seismic CDF for Davis-Besse to be between 6.7×10^{-7} and 6.7×10^{-6} per year using 2008 U.S. Geological Survey (USGS) seismic hazard curves. Since FENOC did not provide a seismic CDF contribution in the ER, the NRC staff used a seismic CDF of 6.7×10^{-6} per year to assess the appropriateness of the external event multiplier used in the SAMA evaluation. The multiplier is discussed further later in this section.

The Davis-Besse IPEEE fire analysis employed a combination of the EPRI's fire-induced vulnerability evaluation (FIVE) methodology (EPRI 1993) and PRA analysis. Since the FIVE methodology allowed only a few of the Davis-Besse fire compartments to be screened, modification of the FIVE process was employed to include more detailed analysis of affected circuits, improved fire initiation frequency quantification, inclusion of fire effects evaluations, and crediting fire prevention and suppression. These enhancements were primarily based on guidance from the EPRI Fire PRA Implementation Guide (EPRI 1995). In the first phase, initial qualitative and quantitative screening was used to identify potentially risk significant fire compartments. Safe shutdown equipment was identified, and the routing of the associated supporting electrical cables was determined and qualitatively evaluated to determine if there were any plant locations that could be screened out due to the absence of safe shutdown equipment or cables. Fire barriers were evaluated to ensure that any screened out compartments could not cause a fire in an adjacent compartment. The results of the fire compartment interaction analysis were used in the detailed fire analyses of each compartment.

The second phase considered equipment failures beyond those caused by the fire. Using the PRA, plant areas with a fire-induced CDF below 1.0×10^{-6} per year were screened from further evaluation. The third phase involved detailed fire analysis of the unscreened compartments using guidance from the Fire PRA Implementation Guide (EPRI 1995), detailed evaluation of the potential for fire damage due to specific fires within an area, and detailed evaluation of the function of specific safe shutdown equipment cables. In this phase, fire frequencies were adjusted to remove some of the conservatism in the frequencies for specific fire initiation sources. This included applying severity factors for certain fixed sources of ignition and crediting early suppression of welding-related fires based on historical fire events data, crediting early suppression of other transient fires based on the presence of an automatic fire detection system in the fire compartment, crediting restrictions on the quantity of transient combustibles and the use of approved storage containers for transient combustibles, crediting the frequency of inspections to verify compliance with the requirements for control of transient combustibles, and eliminating conduits and cable trays that were determined to not be credibly damaged by a fire based on its distance from the ignition source. Based on these results, the fire-induced equipment failure list was modified and more compartments were screened.

FENOC stated that the fire PRA has not been updated since the IPEEE. In Section 3.1.2.1 of the ER, FENOC provides the fire CDF for the four areas having a CDF greater than the screening criteria of 1.0×10^{-6} per year. In response to an NRC staff RAI, FENOC acknowledges that IPEEE Table 4.2.3.2 (Centerior Energy 1996) provides the CDF for 15 fire compartments that were screened out prior to detailed analysis. The NRC IPEEE SER presents the total CDF of these screened out fire compartments to be 3.8×10^{-6} per year. This CDF, and those for each of the four fire zones have a CDF greater than 1.0×10^{-6} per year, are presented in Table F-4. The total fire CDF, determined from summing the values in Table F-4, is 2.9×10^{-5} per year.

Table F-4. Davis-Besse Fire Zones and their Contribution to Fire Core Damage Frequency

Fire Zone	Fire Zone Description	CDF (per year)
Q.01	High voltage switchgear Room B	8.2×10^{-6}
S.01	High voltage switchgear Room A	6.5×10^{-6}
X.01	Low voltage switchgear room	5.9×10^{-6}
FF.01	Control room cabinets	4.3×10^{-6}
Other[(a)]		3.8×10^{-6}
Total Fire CDF (all fire zones)		**2.9×10^{-5}**

[(a)] From the IPEEE SER (NRC 2001).

The NRC staff inquired about additional measures that FENOC had already taken to reduce fire risk since the IPEEE for the four dominant fire areas identified in ER Section E.3.1.2.1 (NRC 2011a). FENOC provided a description of a software tool implemented after issuance of the IPEEE for managing fire risk. This tool tracks inoperable or degraded fire protection features and manages combustible loads and travel paths. This software is maintained by the site fire marshal and controlled by a set of operational procedures. FENOC also provided a SAMA evaluation of these four dominate fire areas, which is discussed further in Section F.3.2.

Considering the above discussion, and the actions taken by FENOC to reduce fire risk since the IPEEE, NRC staff concludes that the fire CDF of 2.9×10^{-5} per year is reasonable for the SAMA analysis.

The Davis-Besse IPEEE analysis of HFO events (high winds, tornadoes, external floods, and other external events) followed the screening and evaluation approaches specified in Supplement 4 to GL 88-20 (NRC 1991) and did not identify any sequences or vulnerabilities that exceeded the 1.0×10^{-6} per year criterion (FENOC 2001). Based on this result, the applicant concluded that these other external hazards would be negligible contributors to overall core damage and did not consider any plant-specific SAMAs for these events. However, the applicant did note that the updated safety analysis report and the control room habitability study did not accurately reflect the current chemicals stored onsite. This is discussed further in Section F.3.2.

Based on the aforementioned results, including the NRC staff assessment of the Davis-Besse seismic CDF, the external events CDF is approximately 3.6 times the internal events CDF (based on a seismic CDF of 6.7×10^{-6} per year, a fire CDF of 2.9×10^{-5} per year, and an internal events CDF of 9.8×10^{-6} per year). The NRC staff requested FENOC increase the internal events benefits from a factor of 3 to 3.6 to account for the seismic hazard and for the CDF associated with screened fire compartments (NRC 2011a). In response to the RAI, FENOC chose to provide a revised SAMA evaluation using an external events multiplier of 4.6 resulting in a total multiplier of 5.6 ($((2.9 \times 10^{-5}+6.7 \times 10^{-6}+1.0 \times 10^{-5})/(1.0 \times 10^{-5})+1)$) to account for external events, which assumes a seismic CDF of 6.7×10^{-6} per year, a fire CDF of 2.9×10^{-5} per year, and an HFO CDF of 1.0×10^{-5} per year (FENOC 2011). This is discussed further in Section F.6.2.

The NRC staff reviewed the general process used by FENOC to translate the results of the Level 1 PRA into containment releases, as well as the results of the Level 2 analysis, as described in the ER and in response to NRC staff RAIs (FENOC 2010, 2011. The Level 2

model is completely revised from the model used in the IPE and reflects the Davis-Besse plant as designed and operated as of September 2009. In response to NRC RAIs, FENOC explains that one of the most significant changes in the Level 2 model was the increase in level detail reflected in the PDSs and the manner in which their frequency is calculated. To better define the status of containment systems to support CET quantification, 14 PDSs were added. Another important change was developing a probability distribution for containment failure as a function of internal pressure. The Level 1 core damage sequences grouped into core damage bins according to similarities in their impact on containment response. The core damage bins, together with the states of containment systems, comprise the nearly 500 PDSs that provide the interface between the Level 1 analysis and Level 2 CET analysis.

Each PDS is analyzed through the Level 2 CET to evaluate the phenomenological progression of the sequence. The current Level 2 model uses a single CET containing both phenomenological and systemic events. In response to an NRC staff RAI, FENOC clarified that the Davis-Besse CET was developed from a B&W owner's group generic CET and refined to address phenomena that could impact reactor cooling system integrity, containment response, and release from containment. The CET end states are assigned to one of nine general and 34 specific release categories based on characteristics that determine the timing and magnitude of the release, whether or not the containment remains intact, and isotopic composition of the release material (FENOC 2010). The frequency of each release category was obtained by summing the frequency of the individual accident progression CET endpoints binned into the release category.

Source term release fractions were developed for each of the 34 release categories based on the results of plant-specific calculations using the MAAP Version 4.0.6. A separate MAAP calculation was performed for each of the 34 release categories. The 2012 SAMA supplement provided updated MAAP results to correct an error in the ER MAAP results (FENOC 2012a). The release categories and their release characteristics and frequencies are presented in Table E.3-13 of the 2012 SAMA supplement (FENOC 2012a) and Table E.3-20 of Appendix E to the ER (FENOC 2010) as corrected in the 2012 SAMA supplement (FENOC 2012a). The updated baseline dose risk and offsite economic risk from the 2012 SAMA supplement were used in the SAMA evaluation (FENOC 2012a).

The total Level 2 release frequency, based on the sum of CET sequences, is 1.0×10^{-5} per year, which is 2 percent higher than the Level 1 internal events CDF of 9.8×10^{-6} per year. This is due to the additional systems included in the Level 2 PRA models and to the presence of minimal cutsets that do not represent viable event sequences. The NRC staff considers that use of the release frequency, rather than the Level 1 CDF, will have a negligible impact as it is very small in comparison to the external events multiplier. The NRC staff asked FENOC to identify the release categories that comprise the LERF and to confirm that these contribute to the LERF importance analysis listing presented in Table E.3-4 (NRC 2011a). In response to the RAI, FENOC identified the release categories comprising LERF and provided a new LERF importance listing based on a re-review and identification of a few minor discrepancies. ER Table E.5-3 was revised to correct the identified discrepancies. This is discussed further in Section F.3.2.

The NRC staff's review of the Level 2 IPE concluded that it addressed the most important severe accident phenomena normally associated with large, dry containments, and it identified no significant problems or errors (NRC 1996). The revisions to the Level 2 model since the IPE, to update the methodology and to address peer review recommendations, are described in Section E.3.2.2 of the ER and in response to NRC staff RAIs (FENOC 2011). The Level 2 PRA

model was included in the B&W owner's group peer review mentioned previously. All peer review findings have been addressed and are considered closed. The NRC staff asked FENOC about the implementation status of suggested plant improvements made in the IPE "back-end" analysis and asked FENOC to identify and evaluate SAMA candidates for those that have not been implemented (NRC 2011a). In response to the RAI, FENOC states that each of the suggested improvements has been implemented (FENOC 2011). This is discussed further in Section F.3.2.

Based on the following information, the NRC staff concludes that the Level 2 PRA provides an acceptable basis for evaluating the benefits associated with various SAMAs:

- the NRC staff's review of the Level 2 methodology,
- the fact that FENOC adequately addressed NRC staff RAIs,
- the fact that the Level 2 PRA model was reviewed as part the 1999 owner's group peer review of the LERF analysis, and
- the 2008 gap self-assessment.

In response to NRC staff RAIs, FENOC explains that the reactor core radionuclide inventory used in the consequence analysis corresponds to the end-of-cycle values for Davis-Besse operating at 2,827 MWt, which incorporates a 2 percent uncertainty in core power. In Section 3.1.2 of the ER, it is stated that the operating license and technical specifications were amended in 2008 to allow an increase in rated thermal power from 2,772 MWt to 2,817 MWt.

The reactor core radionuclide inventory assumes a 2 percent uncertainty margin; therefore, it bounds the uprated power level. The core radionuclide inventory is provided in Table E.3-17 of Appendix E of the ER (FENOC 2010). The ER noted that the description of plant facilities and operations and associated impact evaluations in this ER, therefore, assume operation at 2,827 MWt.

The NRC staff reviewed the process used by FENOC to extend the containment performance (Level 2) portion of the PRA to an assessment of offsite consequences (Level 3). This included consideration of the source terms used to characterize fission product releases for the applicable containment release categories and the major input assumptions used in the offsite consequence analyses. Version 1.12 of the MACCS2 code was used to estimate offsite consequences. Plant-specific input to the code includes the source terms for each release category and the reactor core radionuclide inventory (both discussed above), site-specific meteorological data, projected population distribution within a 50-mi (80-km) radius for the year 2040, emergency evacuation planning, and economic parameters including agricultural production. This information is provided in Section 3.0 of Attachment E to the ER (FENOC 2010), as corrected in the 2012 SAMA supplement for four errors in the MACCS2 input data (FENOC 2012a).

Releases were modeled as occurring at four different elevations, specific to each of the MAAP cases. These heights were ground level, 2.13 meters (m), 18.44 m, or 45.42 m. Building wake effects were modeled assuming a building width of 44 m and height of 73 m. The release energy varied from 265 watts (ambient) to 97 megawatts (MW). These are documented in Table E.3-13 of the ER by release category (FENOC 2010). In response to an NRC staff RAI, FENOC identified the heat release for each release category for sensitivity case A1 (FENOC 2012a). A sensitivity study, Case A1, was performed on the methodology used to calculate the release energy, which resulted in a higher release energy for each release

category. In the sensitivity study, the energy of release was obtained from MAAP by multiplying the mass flow rate times the enthalpy of the release gas. The results showed a decrease in population dose risk of 3.3 percent and in offsite economic cost risk of 5.3 percent (FENOC 2012a). This result is expected since a higher energy release will both increase the radioactive decay period of the plume and increase the extent of dispersion of the plume. Since a higher energy release results in decreased population dose and offsite economic cost risk, the NRC staff concludes that the release parameters used are acceptable for the purposes of the SAMA evaluation.

FENOC used site-specific meteorological data for the year 2006 as input to the MACCS2 code. Meteorological data included wind speed, wind direction, delta-temperature, and precipitation for each hour of the year. Wind speed and direction are collected from various levels at a 100-m primary tower and a nearby 10-m backup tower. The 100-m tower also measures differential temperatures at several levels to determine atmospheric stability. The development of the meteorological data is discussed in Sections 2.10 and E.3.4 of the ER (FENOC 2010). Data from 2006 through 2008 was considered, but the 2006 data was chosen because it was the most complete data set. Data from year 2008 was considered unusable as it contained too many missing long data sequences of unusable data. A sensitivity study, Case M1, was performed using year 2007 data. The results showed a decrease in population dose risk of 0.5 percent and an increase in offsite economic cost risk of 1.1 percent (FENOC 2012a). The NRC staff notes that these results are consistent with previous SAMA analyses that have shown little sensitivity to year-to-year differences in meteorological data.

Missing data were estimated using data substitution methods (FENOC 2011). The 100-m tower measures differential temperatures at several levels to determine atmospheric stability. Mixing heights, which are presented in Table E.3-12 of the ER, were specified for a.m. and p.m. hours and are based on Environmental Protection Agency (EPA) data (EPA 1972). A sensitivity study, Case A2, was performed assuming more extreme values of the meteorological boundary parameters (e.g., stability class, rainfall, wind speed). This resulted in no change in the population dose risk or offsite economic cost risk (FENOC 2012a). The NRC staff concludes that the use of the 2006 meteorological data in the SAMA analysis is reasonable.

The population distribution the applicant used as input to the MACCS2 analysis was estimated for the year 2040 using year 2000 census data as accessed by SECPOP2000 (NRC 2003). In response to an NRC staff RAI, FENOC identified that known code errors in SECPOP2000 did not apply as only the SECPOP2000 population data were used (FENOC 2011). All other site file parameters were developed independently. The year 2040 is 3 years beyond the renewed license year 2037. The baseline population was determined for each of 160 sectors, consisting of the 16 directions for each of 10 concentric distance rings with outer radii at 1, 2, 3, 4, 5, 10, 20, 30, 40 and 50 mi surrounding the site. County population growth estimates were applied to year 2000 census data to develop year 2040 population distribution.

In response to an NRC staff RAI, FENOC revised the Level 3 PRA to include the Canadian population (FENOC 2011). SECPOP2000 contains only United States population data, and the Canadian population was not included in the Level 3 assessment. The year 2000 population from SECPOP2000 and Table 2.6-1 of the ER, which contains the population for Ontario, Canada from the 2001 Canadian census, were used to revise the total population within the 50-mi radius of Davis-Besse. The revised population was escalated to year 2040, resulting in a total population of 2,903,790.

In a clarification to a response to an NRC staff RAI, FENOC confirmed that transient population was included in the revised population (between 0 and 30 mi) (NRC 2011b). The transient population segment includes seasonal residents, transient population, and boating population. The seasonal population group comprises those people who reside in the area during warmer months, principally May through October. The transient population group comprises those people who enter the area for a specific purpose (e.g., recreation) and who leave on the same day or stay overnight at motels and hotels. The distribution of the population is given for the 10-mi radius from the Davis-Besse plant site and for the 50-mi radius from the Davis-Besse site in the revised Table E.3-11 of the RAI responses (FENOC 2011). The SAMA analysis was revised to use the revised population estimate, and relevant revised sections of the ER were provided in the RAI response. The revisions included the addition of the Canadian population, revised cost-benefit results, and revised base case and sensitivity case comparisons discussed in this section and in Section F.6. The population dose reported in Table F-2 also incorporates the results of the revised population estimate. A sensitivity case, Case S1, was performed using a population escalation to year 2060 and a second sensitivity case, Case S2, for a less conservative population escalation to year 2040 (1.5 percent per decade). A base population escalation of 4.7 percent per decade was used in the SAMA analysis, which is the rate of increase in the population of Ohio between 1990 and 2000 based on census records. The escalation to year 2060 showed an increase in population dose risk of 9.4 percent and in offsite economic cost risk of 9.2 percent (FENOC 2012a). The 1.5 percent escalation showed a decrease in population dose risk of 11.3 percent and in offsite economic cost risk of 10.9 percent (FENOC 2012a). The NRC staff considers the methods and assumptions for estimating population reasonable and acceptable for purposes of the SAMA evaluation.

FENOC performed sensitivity analyses to determine the impact on population dose risk and offsite economic cost risk for changes to release energy, meteorology, warning delay time, evacuation speed, sheltering, population and water shed assumptions as shown in Table F-5.

Table F-5. Impact on Population Dose Risk and Offsite Economic Cost Risk for Selected Sensitivity Cases

Sensitivity Case	Population Dose Risk (person-rem/year)			Offsite economic Cost Risk (dollars/year x 1000)		
	Baseline Result	Sensitivity Result	% Difference	Baseline Result	Sensitivity Result	% Difference
Case A1—Simpler release energy methodology	2.12	2.05	-3.3	3.59	2.40	-5.3
Case A2—More extreme values of meteorological boundary parameters	2.12	2.12	0	3.59	3.59	0
Case A3—Increase warning delay time to 20 minutes	2.12	2.12	0	3.59	3.59	0
Case E1—Increase evacuation speed to 1.0 mps	2.12	2.11	-0.5	3.59	3.59	0
Case E2—Change sheltering shielding to brick housing	2.12	1.62	-23.6	3.59	2.16	-39.8

Sensitivity Case	Population Dose Risk (person-rem/year)			Offsite economic Cost Risk (dollars/year x 1000)		
	Baseline Result	Sensitivity Result	% Difference	Baseline Result	Sensitivity Result	% Difference
Case E3—4.7% per decade escalation in population and proportional decrease in evacuation speed	2.12	2.12	0	3.59	3.59	0
Case M1—Use year 2007 meteorological data	2.12	2.11	-0.5	3.59	3.63	+1.1
Case S1—Population escalation to year 2060	2.12	2.32	+9.4	3.59	3.92	+9.2
Case S2—Population escalation of 1.5% per decade	2.12	1.88	-11.3	3.59	3.20	-10.9
Case S3—Watershed index of 1.0 for all sectors	2.12	2.18	+2.8	3.59	3.59	0

The emergency evacuation model was modeled as a single evacuation zone extending out 10 mi (16 km) from the plant. FENOC assumed that 95 percent of the population would evacuate. This assumption is conservative relative to the NUREG-1150 study (NRC 1990), which assumed evacuation of 99.5 percent of the population within the emergency planning zone (EPZ). The evacuated population was assumed to move at an average speed of approximately 0.58 meters per second (mps) (1.3 miles per hour (mph)) with a delayed start time of 4 hours and 55 minutes after declaration of a general emergency. The evacuation speed was derived from the projected time to evacuate the entire EPZ under the most conservative (long-time) conditions for "Summer, Midday, Weekend" (FENOC 2010). In response to an NRC staff RAI, FENOC identified that the evacuation analysis did not clearly identify a reference year for the EPZ population, and it was assumed to be year 2000 (FENOC 2011). No correction of the EPZ evacuation speed was made for the year 2040 population. In further response to the RAI, FENOC performed a sensitivity study, Case E3, using a 4.7 percent per decade escalation of the year 2000 EPZ population to year 2040 and assumed the evacuation speed decreased proportional to the population increase, or to 0.52 mps (1.2 mph). This resulted in no change in population dose risk and no change in offsite economic cost risk (FENOC 2011). A sensitivity study, Case E1, was performed in which the evacuation speed was increased to 1.0 mps (2.2 mph). This resulted in a 0.9 percent decrease in the total offsite population dose risk and no change in the offsite economic cost risk (FENOC 2011). An additional sensitivity study, Case A3, was performed for the warning delay time. The base case assumed about 300 seconds (5 minutes). The sensitivity case increased the warning time to 20 minutes. This resulted in no change in population dose risk and no change in offsite economic cost risk (FENOC 2012a). One additional sensitivity case was performed for shielding factors. The base case assumed wood housing, and the sensitivity case, Case E2, assumed brick. The sensitivity results showed a decrease in population dose risk of 23.6 percent and in offsite economic cost risk of 39.8 percent (FENOC 2012a). The NRC staff concludes that the evacuation assumptions and analysis are reasonable and acceptable for the purposes of the SAMA evaluation.

Site-specific agriculture and economic data were provided from 2007 National Census of Agriculture (USDA 2009a, 2009b) data for each of the 10 counties surrounding Davis-Besse to a distance of 50 mi (80 km). This included the fraction of land devoted to farming, annual farm sales, the fraction of farm sales resulting from dairy production, and the value of both farmland and non-farmland. Non-farm wealth was derived from 2005 and 2006 property tax valuations (MDT 2007; ODT 2008). A sensitivity case, Case S3, was performed using a water shed index of 1.0 (maximum runoff consequences) for all sectors. The results showed an increase in population dose risk of 2.8 percent and no change to offsite economic cost risk (FENOC 2011).

Area-wide farm wealth was determined from 2005 and 2006 property tax valuations (MDT 2007; ODT 2008) and county statistics for farmland, buildings, and machinery, with only the fraction of each county within 50 mi of Davis-Besse considered. The daily cost of compensation for evacuees and short-term relocatees used the year 2000 census economic data for each state (USCB 2000; USGSA 2000). In addition, parameters describing the cost of population and business relocation, farm and non-farmland decontamination, and decontamination labor used MACCS2 default values (NRC 1998a). An escalation factor of 1.95 based on the consumer price index was applied to these parameters to account for cost escalation from 1986 (the year the input was first specified) to 2009 (FENOC 2012b).

The NRC staff concludes that the methodology used by FENOC to estimate the offsite consequences for Davis-Besse provides an acceptable basis from which to proceed with an assessment of risk reduction potential for candidate SAMAs. Accordingly, the NRC staff based its assessment of offsite risk on the CDF and offsite doses reported by FENOC.

F.3 Potential Plant Improvements

The process for identifying potential plant improvements, an evaluation of that process, and the improvements evaluated in detail by FENOC are discussed in this section.

F.3.1 Process for Identifying Potential Plant Improvements

FENOC's process for identifying potential plant improvements (SAMAs) consisted of the following elements:

- review of the dominant cutsets and most significant basic events from the current, plant-specific PRA,
- review of potential plant improvements identified in the Davis-Besse IPE and IPEEE,
- review of SAMA candidates identified for LRAs for selected pressurized-water reactor (PWR) plants, and
- review of other industry documentation discussing potential plant improvements.

Based on this process, an initial set of 167 candidate SAMAs, referred to as Phase I SAMAs, was identified. In Phase I of the evaluation, FENOC performed a qualitative screening of the initial list of SAMAs and eliminated SAMAs from further consideration using the following criteria:

- The SAMA has design difference or has already been implemented at Davis-Besse.
- The SAMA is not applicable to Davis-Besse.

- The SAMA has estimated implementation costs that would exceed the dollar value associated with eliminating all severe accident risk at Davis-Besse.
- The SAMA is related to a non-risk significant system and, therefore, has a very low benefit.
- The SAMA Is similar in nature and could be combined with another SAMA candidate.

Based on this screening, 152 SAMAs were eliminated, leaving 15 for further evaluation. The remaining SAMAs, referred to as Phase II SAMAs, are listed in Table E.7-1 of the ER (FENOC 2010). In Phase II, a detailed evaluation was performed for each of the 15 remaining SAMA candidates, as discussed in Sections F.4 and F.6 below. To account for the potential impact of external events, the estimated benefits based on internal events were multiplied by a factor of 5.6, as previously discussed.

In response to NRC staff RAIs, FENOC re-evaluated all SAMAs screened in Phase I as "Very Low Benefit" using a recalculated maximum benefit based on an increased multiplier of 5.6 to account for the impact of external events. Based on this reevaluation, no additional SAMAs screened in Phase I were retained for the detailed Phase II evaluation.

F.3.2 Review of FENOC's Process

FENOC's efforts to identify potential SAMAs focused primarily on areas associated with internal initiating events but also included explicit consideration of potential SAMAs for fire and seismic events. The initial list of SAMAs generally addressed the accident sequences considered to be important to CDF from functional, initiating event, and risk reduction worth (RRW) perspectives at Davis-Besse.

FENOC's SAMA identification process began with a review of the list of potential PWR enhancements in Table 14 of Nuclear Energy Institute (NEI) 05-01 (NEI 2005). Review of this generic SAMA list resulted in all of the SAMAs from this table being identified as Phase I SAMAs, for a total of 154 Phase I SAMAs.

FENOC provided a tabular listing of the Level 1 PRA basic events sorted according to their RRW and the top 100 cutsets (FENOC 2010). SAMAs impacting these cutsets and basic events would have the greatest potential for reducing risk. For the basic events listing, FENOC used an RRW cutoff of 1.005, which corresponds to about a 0.5 percent change in CDF given 100-percent reliability of the SAMA. The NRC staff requested FENOC to identify the SAMA candidates that address each of the basic events having an RRW equating to a benefit greater than the minimum cost of a procedure change (NRC 2011a). In response to the RAI, FENOC provided a review of all Level 1 basic events having an RRW greater than or equal to 1.03, which corresponds to about a 3 percent change in CDF given 100-percent reliability of the SAMA (FENOC 2011). This equates to a benefit of approximately $10,000 for internal events, which is the estimated minimum cost of a procedure change. Based on the review of evaluations from other plants, the $10,000 estimated minimum cost for a procedure change is conservative.

Of the over 40 basic events reviewed, SAMA candidates were identified for all but 12 of the basic events. These remaining basic events were found to be: (1) events that had no physical meaning (such as a flag event or a plant configuration probability event); (2) events for which no feasible SAMA was identified; (3) events that could only be addressed by a hardware modification and had a maximum benefit less than the minimum cost of $100,000 for a

hardware change; or, (4) events that are being addressed by the installation of new steam generators in 2013.

In addition, as a result of the reevaluation of the Level 1 basic importance list in the RAI response, FENOC identified new SAMA candidate OT-09R, "present the highest worth PRA human actions to the Davis-Besse operator training." This SAMA candidate was, however, subsequently found by FENOC to already be implemented at Davis-Besse. Davis-Besse provides PRA information such as risk significant initiating events, high worth operator actions and high worth equipment. This information is provided to various departments and is presented on posters throughout the plant. In response to other NRC staff RAIs, FENOC explained that the following eight SAMA candidates were identified from plant-specific risk insights during the review of the cutsets and Level 1 basic events importance list: CB-20, install relief valves in the CCW system; CB-21, install pressure measurements between the two DHR suction valves in the line from the RCS hot leg; CC-19, provide automatic switchover of HPI and LPI suction from the BWST to containment sump for LOCAs; CC-21, reduce the BWST level at which switchover to containment recirculation is initiated; CP-19, install a redundant containment fan system; CW-24, replace the standby CCW pump with a pump diverse from the other two CCW pumps; CW-25, provide the ability to cool makeup pumps using fire water in the event of loss of CCW; and FW-16, perform surveillances on manual valves used for backup AFW pump suction. (FENOC 2011).

The NRC staff asked FENOC to specifically address the potential for SAMAs for the following basic events in the importance listing: WHAF3ISE, failure to isolate flood in room 328 before CCW pumps are affected; SHAF2ISE, failure to isolate flood before service water pumps are affected; F3AM, maximum flood in CCW pump room from service water (initiating event) and F7L, large circulating water flood in turbine building (initiating event) (NRC 2011a). In response to the RAI, FENOC explained that no SAMAs were identified for the first three events because they did not have an RRW benefit value equal to or greater than the cost of a procedural change (FENOC 2011). However, Phase I SAMA candidate FL-01, "improve inspection of rubber expansion joints on the main condenser," was identified to address basic event F7L. FENOC determined, after further evaluation of this SAMA, that it was already implemented at Davis-Besse and, as a result, the screening disposition for FL-01 was reclassified in the Phase I screening from having a very low benefit to already implemented.

The NRC staff asked FENOC to evaluate a SAMA for basic events QMBAFP11 and QMBAFP12, which involve maintenance outages of the auxiliary feedwater (AFW) trains, which would make improvements to AFW maintenance practices or hardware (NRC 2011a). In response to the RAI, FENOC explained that AFW maintenance unavailability data used in the PRA is based on Maintenance Rule data and is consistent with the generic industry unavailability data reported in NUREG/CR-6928 (FENOC 2011). FENOC further explained that improvements to maintenance practices at Davis-Besse are proposed and evaluated as an element of normal business practices to maintain the AFW train unavailability at its lowest achievable value. Based on the unavailability of the AFW being consistent with the industry unavailability data, and because of the high cost of making improvements to safety-related hardware, FENOC concluded that a SAMA to improve the availability of the AFW pumps is not expected to be cost-beneficial. Based on this information, the NRC staff agrees that a SAMA to improve the availability of the AFW pumps is unlikely to be cost-beneficial.

The NRC staff noted that there are a significant number of operator errors and non-recovery actions that appear in the CDF and LERF importance listings and top 100 cutsets listing, yet no weakness in training or procedures was identified. In light of this, the NRC staff asked FENOC

to explain the process used to make the determination that no opportunities exist to improve training or procedures and to discuss whether opportunities exist for reducing risk by providing automatic functions to risk significant operator actions (NRC 2011a). In response to the RAI, FENOC explains that, based on its analysis of human failure events using the EPRI HRA calculator, no specific vulnerabilities in procedures, training, staff, assumptions, performance shaping factors, or timing were found (FENOC 2011). FENOC further explains, however, that two additional SAMA candidates were evaluated to address risk-significant operations—AC/DC-28R, "automatically start and load the SBO DG on Bus D2 upon loss of power to the bus," and OT-08R, "automatically start and load the SBO DG on Bus D2 upon loss of power to the bus in combination with automatically starting the motor-driven feedwater pump (MDFP)." These are discussed further in Section F.6.2. In a clarification to the RAI response, FENOC concludes that the opportunities to automate operator actions has been fully considered because, in addition to these two additional SAMA candidates, three new SAMA candidates related to automating operator actions were evaluated in response to other NRC staff RAIs (SAMAs CC-22R, CW-26R, and FW-17R defined in Table F-6 and discussed in Section F.6.2). Five SAMA candidates were identified and evaluated in the ER to evaluate automating operator actions (SAMAs AC/DC-14, AC/DC-25, AC/DC-26, AC/DC-17, and CC-19), and other additional Phase I SAMA candidates to automate operator actions were identified but screened from the Phase II evaluation. Additionally, all basic events having an RRW equal to or greater than the cost of a procedure change were reviewed for SAMA candidates (NRC 2011b). The NRC staff concludes that the opportunity for SAMA candidates to automate operator actions has been adequately explored, and it is unlikely that there are additional cost-beneficial SAMA candidates to automate operator actions.

FENOC also provided and reviewed the LERF-based RRW events down to a RRW of 1.005 (FENOC 2010). In response to an NRC staff RAI, FENOC provided a review of all Level 2 basic events having an RRW greater than or equal to 1.03 as was done for the Level 1 basic events (FENOC 2011). FENOC explained that the RRW for the Level 2 basic events was calculated based on LERF rather than CDF and that the estimated benefit for each basic event was derived by taking the RRW for LERF and applying the maximum benefit used for the CDF event, which is conservative. Of the over 20 basic events reviewed, SAMA candidates were identified for about half of the basic events. The remaining basic events were found to be: (1) events that had no physical meaning (such as a flag event or a plant configuration probability event); (2) events for which no feasible SAMA was identified; (3) events that could only be addressed by a hardware modification and had a maximum benefit less than the minimum cost of $100,000 for a hardware change; or, (4) that are being addressed by the installation of new steam generators in 2013. No new SAMA candidates were identified from this review.

FENOC reviewed the SAMA candidates from prior SAMA analyses for nine PWR sites. FENOC's review did not identify any additional SAMA candidates applicable to Davis-Besse that were not already identified from the importance analysis review described above.

For some of the SAMAs listed in the ER, the information provided did not sufficiently describe the proposed modification. Therefore, the NRC staff asked the applicant to provide more detailed descriptions of the modifications for several of the SAMA candidates (NRC 2011a). In response to the RAI, FENOC provided the requested information on the modifications for SAMAs: AC/DC-01, provide additional DC battery capacity; CC-19, install a redundant containment fan system; AC/DC-25, provide a dedicated DC power system (battery/battery charger) for TDAFW control; and CW-24, replace the standby CCW pump with a pump diverse from the other two CCW pumps (FENOC 2011).

FENOC considered both the potential plant improvements and risk insights described in the IPE and IPEEE in the identification of plant-specific candidate SAMAs for internal and external events. Although the IPE did not identify any vulnerabilities, seven "front-end" (Level I PRA) and four "back-end" (Level II PRA) plant improvements were identified in Part 6, Sections 3.1 and 3.2, respectively, of the IPE report. FENOC identified five additional SAMA candidates to address the five "front-end" plant improvements from the IPE—AC/DC-25, AC/DC-26, AC/DC-27, HV-06 (Provide procedural guidance for establishing an alternate means of room ventilation to the service water pump room), and CC-20 (Modify hardware and procedures to allow using the makeup pumps for high pressure recirculation from the containment sump).

The NRC staff requested information regarding the status of the four suggested "back-end" improvements from the IPE (NRC 2011a). In response to the RAI, FENOC clarified that the four suggested improvements (i.e., reduce the BWST level during switchover to sump recirculation, improve operator actions for inadequate core cooling, re-examine the emergency plan evacuation criteria, and monitor carbon monoxide levels in containment) have been implemented.

The NRC staff requested information regarding lower cost alternatives to some of the SAMAs evaluated (NRC 2011a), including those listed below:

(a) automate RCP trip on high motor bearing cooling temperature,

(b) use the decay heat removal (DHR) system as an alternate suction source for high-pressure injection (HPI)

(c) automate HPI injection on low pressurizer level (in loss of secondary side heat removal cases where the reactor coolant system (RCS) pressure remains high while the RCS level drops),

(d) automate refill of the BWST,

(e) automate start of AFW pump in the event the automated emergency feedwater (EFW) system is unavailable, and

(f) purchase or manufacture of a "gagging device" that could be used to close a stuck-open steam generator safety valve for an SGTR event prior to core damage.

In response to the RAIs, FENOC addressed the suggested lower cost alternatives and determined that they were either already implemented at Davis-Besse (b), not feasible (c), or not cost-beneficial (a, d, e, and f)(FENOC 2011). This is discussed further in Section F.6.2.

Based on this information, the NRC staff concludes that the set of SAMAs evaluated in the ER, together with those identified in response to NRC staff RAIs, addresses the major contributors to internal event CDF.

The Davis-Besse IPEEE seismic evaluation identified one unresolved outlier remaining from implementation of the USI A-46 Program. The one unresolved outlier was the identification of two flammable compressed gas bottles in the auxiliary building with inadequate seismic mounting. An action to address the seismic-fire interaction issues associated with these flammable compressed gas bottles was identified and implemented by the applicant (NRC 2001). The USI A-46 SER for Davis-Besse indicates that the license had completed the resolution of all outliers (NRC 2000).

As discussed in Section F.2.2, the NRC staff requested information regarding any plant improvements for identified structures and components with an HCLPF value of less than 0.3 g (i.e., BWST roof, Masonry Wall No. 2367, Masonry Wall No. 3407, Masonry Wall No. 4786, and Masonry Wall No. 6107). The NRC staff asked the applicant to identify and evaluate SAMAs to improve the seismic capacity of these components and structures (NRC 2011a). In response to the RAI, FENOC explains that seismic improvements have been made to two of the masonry walls and that the Davis-Besse masonry wall analysis has been updated to ensure that the other two masonry walls met allowable stresses and design basis requirements (FENOC 2011). In a clarification to the RAI response, FENOC further explains that SAMA CC-10, which considers providing an in-containment reactor water storage tank, meets the intent of improving the seismic capacity of the BWST by providing a tank independent of the BWST (NRC 2011b).

The IPEEE did not identify opportunities for improvements related to fire events (FENOC 1996). FENOC also did not identify any other plant vulnerabilities in the IPEEE that would impact the PRA CDF (FENOC 2010).

The NRC staff asked FENOC to review each of the four dominant fire areas discussed in Section F.2.2 to identify potential SAMA candidates to reduce fire risk and to provide an assessment of identified SAMA candidates (NRC 2011a). FENOC responded that the main contributors to fire risk in all four areas are the MDFP, AFW system, and pilot-operated relief valve (PORV) (FENOC 2011). Loss of all feedwater or the inability to perform feed and bleed cooling are the primary contributors to CDF. FENOC's search for SAMA candidates, therefore, focused on these two fire-induced failure scenarios and determined that existing Phase I SAMAs (CC-16, FW-02, FW-08, FW-09, FW-10, and FW-11) already adequately address these contributors to CDF.

The NRC staff identified three SAMA candidates (CB-02, CP-21, and OT-07) that were screened on very low benefit based on low contribution to LERF. In light of the fact that the release categories comprising LERF were not identified in the ER, the NRC staff asked FENOC to justify screening out these SAMA candidates (NRC 2011a). In response to the RAI, FENOC explains two of these SAMAs (CB-02 and CP-21) do not contribute to LERF and, therefore, are appropriately screened (FENOC 2011). FENOC also clarified that the screening basis in the ER for SAMA OT-07 was incorrect and that this SAMA was screened on the basis of its contribution to both CDF and LERF.

The NRC staff noted that several Phase I SAMAs were screened by being subsumed into other SAMAs and asked FENOC to either confirm that cost to implement these SAMAs is lower than those into which the SAMA was subsumed or provide a revised basis for the Phase I screening (NRC 2011a). In response to the RAI, FENOC explained that four such SAMAs (i.e., AC/DC-06, AC/DC-09, AC/DC-20, and CC-08) have an equivalent or higher implementation cost than the SAMAs into which they were subsumed (FENOC 2011). FENOC also provided a cost-benefit evaluation of these SAMAs. This is discussed further in Section F.6.2. FENOC further explained that the fifth subsumed SAMA (i.e., CB-07) was subsumed into SAMA CB-08, which was screened as already implemented at Davis-Besse. FENOC also determined that SAMA CB-08 was already implemented and rescreened this SAMA on that basis.

The NRC staff noted that Phase I SAMA CB-18, "direct steam generator flooding after an SGTR, prior to core damage," was screened because it could impact efforts to mitigate SGTR, but it points out that this SAMA has been shown to be cost-beneficial in other SAMA analyses and asked FENOC to evaluate this SAMA (NRC 2011a). FENOC explained that in the

Davis-Besse PRA model the SGTR sequences are grouped into core damage bins in which either feedwater is unavailable to the steam generators and, therefore, flooding the steam generators is not possible or feedwater is available and scrubbing is already expected to occur so that flooding the steam generators provides no additional scrubbing benefit (FENOC 2011). Based on this, FENOC concludes that further evaluation of SAMA CB-18 is not warranted. Based on the once-through steam generator design used at Davis-Besse, the NRC staff agrees with this conclusion.

FENOC did not identify any additional SAMA candidates in the 2012 SAMA supplement (FENOC 2012a)

The NRC staff notes that the set of SAMAs submitted is not all-inclusive, since additional, possibly even less expensive, design alternatives can always be postulated. However, the NRC staff concludes that the benefits of any additional modifications are unlikely to exceed the benefits of the modifications evaluated and that the alternative improvements would not likely cost less than the least expensive alternatives evaluated, when the subsidiary costs associated with maintenance, procedures, and training are considered.

The NRC staff concludes that FENOC used a systematic and comprehensive process for identifying potential plant improvements for Davis-Besse, and the set of SAMAs evaluated in the ER, together with those evaluated in response to NRC staff inquiries, is reasonably comprehensive and, therefore, acceptable. This search included reviewing insights from the plant-specific risk studies and reviewing plant improvements considered in previous SAMA analyses. While explicit treatment of external events in the SAMA identification process was limited, it is recognized that the prior implementation of plant modifications for fire risks, the absence of external event vulnerabilities (as documented in the IPEEE), and the use of an external events multiplier reasonably justifies examining primarily the internal events risk results for this purpose.

F.4 Risk Reduction Potential of Plant Improvements

FENOC evaluated the risk-reduction potential of the 15 SAMAs retained for the Phase II evaluation in the ER. The SAMA evaluations were generally performed in a bounding fashion in that the SAMA was assumed to eliminate all of the risk associated with the proposed enhancement. FENOC also provided the risk-reduction potential of six additional SAMAs (i.e., AC/DC-28R, OT-08R, CW-26R, CC-22R, FW-17R, and CB-22R) identified in response to RAIs using the same bounding approach. This bounding approach overestimates the benefit and is conservative.

FENOC used model re-quantification to determine the potential benefits. The CDF, population dose, and offsite economic cost reductions were estimated using the Davis-Besse SAMA analysis model. The changes made to the model to quantify the impact of SAMAs are detailed in Table E.7-1 of Attachment E to the ER (FENOC 2010). The changes made to the model to determine the risk reduction for the six SAMAs identified in response to NRC staff RAIs are provided in a clarification to the RAI responses (NRC 2011b). Table F-6 lists the assumptions considered to estimate the risk reduction for each of the evaluated SAMAs, the estimated risk reduction in terms of percent reduction in CDF and population dose, and the estimated total benefit (present value) of the averted risk. The estimated benefits reported in Table F-6 reflect the combined benefit in both internal and external events. The determination of the benefits for the various SAMAs is further discussed in Section F.6.

The NRC staff requested FENOC to clarify why the population dose risk reduction in Table E.7-2 of the ER is either 10 percent or 0 percent and to explain how population dose risk was calculated (NRC 2011a). In response to the RAI, FENOC clarified that binary appearance of the reported population dose risk reduction is due to the round-off used in spreadsheet calculations (FENOC 2011). It was further explained that the population dose for each SAMA candidate is determined using the population dose determined by MACCS2 for each release category, the release category frequency from the PRA, and the sum of the population dose risk times the frequency for all release categories. The percent change is determined by comparison of the population dose risk for each SAMA candidate compared with the base case. In addition, FENOC regenerated the population dose risk reduction for all SAMAs evaluated, including the new SAMAs evaluated in response to NRC RAIs, to a higher number of significant digits to illustrate the distinction between the population dose risk values for each SAMA candidate. The regenerated population dose risk reduction for each SAMA candidate includes the revised Level 3 PRA analysis to include the Canadian population, as discussed in Section F.2.2. The revised population dose risk values having more significant figures are provided in Table F-6.

The NRC staff noted that the risk reduction reported for SAMA AC/DC-14, "install a gas turbine generator," which assumes failure of the SBO DG is eliminated, does not appear to credit the situation where all emergency diesel generators (EDGs) are unavailable, and it asked FENOC to provide an assessment of this apparent omission (NRC 2011a). FENOC responded that, in the PRA model, the SBO DG is modeled as a backup to either EDG 1 or EDG 2 or both when they are unavailable (FENOC 2011). FENOC also explained that the analysis of this SAMA conservatively eliminated failure of the SBO DG ensuring that one train of emergency power was always available.

The NRC staff has reviewed FENOC's bases for calculating the risk reduction for the various plant improvements and concludes that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative (i.e., the estimated risk reduction is higher than what would actually be realized). Accordingly, the NRC staff based its estimates of averted risk for the various SAMAs on FENOC's risk reduction estimates.

Table F-6. SAMA Cost-Benefit Screening Analysis for Davis-Besse[(a)]

SAMA	Modeling Assumptions	% Risk Reduction		Total benefit ($)[(c)]		Cost ($)
		CDF	Population Dose[(c)]	Using 7% Discount Rate	Using 3% Discount Rate	
AC/DC-01—Provide additional DC battery capacity	Reduce the offsite power non-recovery probabilities to reflect an increase in battery life to 7 hours from 1 hour	6	2	100K	150K	1.75M
AC/DC-03—Add a portable, diesel-driven battery charger to existing DC system	Eliminate loss of DC power from station batteries due to loss of DC battery chargers	22	12	400K	600K	330K
AC/DC-14—Install a gas turbine generator	Eliminate failure of the SBO DG and associated operator actions	10	16	240K	360K	2.0M

SAMA	Modeling Assumptions	% Risk Reduction		Total benefit ($)[c]		Cost ($)
		CDF	Population Dose[c]	Using 7% Discount Rate	Using 3% Discount Rate	
AC/DC-19—Use fire water system as a backup source for diesel cooling	Eliminate failure of the EDGs due to loss of CCW system	2	2	39K	60K	700K
AC/DC-21—Develop procedures to repair or replace failed 4 kV breakers	Eliminate failure of the 4 kV breakers	3	<1	48K	72K	100K
AC/DC-25—Provide a dedicated DC power system (battery/battery charger) for turbine-driven auxiliary feedwater (TDAFW) control	Eliminate failure of the TDAFW system due to loss of DC power	15	3	240K	370K	2.0M
AC/DC-26—Provide an alternator/generator that would be driven by each TDAFW pump to provide DC control power	Eliminate failure of the TDAFW system due to loss of DC power	15	3	240K	370K	2.0M
AC/DC-27—Increase the size of the SBO fuel oil tank	Eliminate failure of the operators to refuel the oil tank	0	0	0	0	550K
CB-21—Install pressure measurements between the two DHR suction valves in the line from the RCS hot leg	Eliminate latent failure of the upstream DHR suction valve (i.e., eliminate failures of the inboard isolation valve DH12 prior to demand)[d]	0	6	30K	46K	550K
CC-01—Install an independent active or passive HPI system	Eliminate failure of one HPI train	0	1	3.4K	5.3K	6.5M
CC-04—Add a diverse low-pressure injection (LPI) system	Eliminate failure of one LPI train	0	0	0	0	5.5M
CC-05—Provide capability for alternate LPI via diesel-driven fire pump	Eliminate failure of one LPI train and eliminate failure of LPI due to loss of AC/DC power	0	0	0	0	6.5M
CC-19—Provide automatic switchover of HPI and LPI suction from the BWST to containment sump for LOCAs	Eliminate operator failures to switchover HPI and LPI suction to the containment sump	1	0	15K	23K	1.5M

SAMA	Modeling Assumptions	% Risk Reduction		Total benefit ($)[c]		Cost ($)
		CDF	Population Dose[c]	Using 7% Discount Rate	Using 3% Discount Rate	
HV-01—Provide a redundant train or means of ventilation	Eliminate failure of the low voltage switchgear room ventilation	0	<1	1.4K	2.1K	50K
HV-03—Stage backup fans in switchgear rooms	Eliminate failure of the low voltage switchgear room ventilation	0	<1	1.4K	2.1K	400K
AC/DC-28R[b]—Automatic start and load SBO DG on Bus D2 on loss of power to that bus	Eliminate operator failure to start the SBO DG	17	4	280K	420K	1.6M
CB-22R[b]—Purchase or manufacture of a "gagging device" that could be used to close a stuck-open steam generator safety valve for an SGTR event prior to core damage	Eliminate failure of main steam safety valve to close	3	12	110K	170K	4.6M
CC-22R[b]—Automatic refill of the BWST	Eliminate operator failure to refill the BWST	0	0	0	0	2.2M
CW-26R[b]—Automatic RCP trip on high motor bearing cooling temperature	Eliminate operator failure to trip the RCPs on loss of seal cooling and injection	23	3	365K	550K	1.5M
FW-17R[b]—Automatic start of AFW pump in the event the automated emergency system is unavailable	Eliminate operator failure to start the MDFP	25	6	410K	620K	2.8M
OT-08R[b]—Automatic start and load SBO DG on Bus D2 on loss of power to that bus in combination with automatically starting the MDFP	Eliminate operator failure to start the MDFP and SBO DG	43	9	700K	1.1M	4.4M

[a] SAMAs in bold are potentially cost-beneficial.

[b] SAMA description and evaluation provided in response to NRC staff RAIs 5.d and 7a–f (FENOC 2011). SAMA modeling assumptions provided in a clarification to the RAI responses (NRC 2011b).

[c] Estimated population doses and benefits reflect revised values provided in response to NRC staff RAIs 3.c, 4.b, and 6.e and to correct five errors identified in the 2012 SAMA supplement (FENOC 2011, 2012a).

[d] Modeling assumption clarified in response to NRC staff RAI 6.h (FENOC 2011).

F.5 Cost Impacts of Candidate Plant Improvements

FENOC developed plant-specific costs of implementing the original 15 Phase II candidate SAMAs as well as 6 additional SAMAs identified in response to NRC staff RAIs. The NRC staff asked FENOC to describe the level of detail used to develop the cost estimates and to clarify whether the cost estimates accounted for inflation, contingency costs associated with unforeseen implementation obstacles, replacement power during extended outages, and maintenance and surveillance costs during plant operation (NRC 2011a). In response to the RAI, FENOC clarified that the cost estimates conservatively did not include inflation, contingency costs associated with unforeseen implementation obstacles, or the cost of replacement power during extended outages required to implement the modifications (FENOC 2011). FENOC also clarified that the cost estimates considered the cost of equipment, fuel, space requirements, and the extent of the modifications and were developed by an expert panel that was composed of experienced staff drawn from engineering, operations, procurement, and project management. It was further explained that some implementation costs were assigned standard values based on plant experience or estimated man-hour requirements and that the following is true:

- minimal procedure changes would be between $10,000 and $50,000,
- procedural changes with engineering support would be between $50,000 and $200,000,
- procedural changes with engineering support and testing or training would be between $200,000 and $300,000, and
- minimal physical plant changes would start at $100,000.

Support activities included costs associated with procurement, installation, long-term maintenance, surveillance, calibration, and initial and on-going training.

The NRC staff reviewed the bases for the applicant's cost estimates (presented in Section E.7.2 of Attachment E to the ER). For certain improvements, the NRC staff also compared the cost estimates to estimates developed elsewhere for similar improvements, including estimates developed as part of other applicant's analyses of SAMAs for operating reactors. Specifically, the NRC staff requested justification for the estimated cost of $1.5 million for implementation of SAMA CC-19, "provide automatic switch over of HPI and LPI suction from the BWST to containment sump for LOCAs." This amount seems high for what is described as a capability that already exists at Davis-Besse but has been deactivated and is also higher than that estimated by other applicants (NRC 2011a). FENOC explained that the expert panel made the following assumptions in developing the cost estimate for this SAMA candidate (FENOC 2011):

- reconnection and reactivation of automatic switchover equipment that is already in place,
- re-performing the Appendix R analyses since the associated valves were de-powered to meet Appendix R criteria (approximately $500,000),
- modifications to safety-related equipment and the associated calculation support (approximately $500,000),
- procedure changes and initial testing and training (approximately $300,000), and
- ongoing testing, surveillances, maintenance, and training (approximately $200,000).

Based on the need for the Appendix R analysis, the NRC staff finds FENOC's justification for the cost estimate for SAMA CC-19 reasonable.

The NRC staff requested justification for the estimated cost of $2 million for implementation of SAMA AC/DC-25, "provide a dedicated DC power system (battery/battery charger) for the TDAFW control valve and NNI-X for steam generator level indication." This amount seems high for a system dedicated to just the TDAFW control valves and in light of the lower estimated costs for similar SAMA candidates AC/DC-01 and AC/DC-03 (NRC 2011a). In response to the RAI, FENOC explained that the expert panel made the following assumptions in developing the cost estimate for this SAMA candidate (FENOC 2011):

- a dedicated set of batteries and battery charger with a longer battery lifetime than the existing safety-related DC system and automatic steam generator level control,
- safety-related space for the batteries (approximately $400,000),
- modifications to safety-related equipment with seismic evaluation and associated calculation support (approximately $500,000),
- procedure changes and initial testing and training (approximately $300,000), and
- procurement and installation of batteries and other components and equipment (approximately $700,000).

Based on the estimated cost for additional safety-related space for the batteries, the NRC staff finds FENOC's justification for the cost estimate for SAMA AC/DC-25 reasonable.

The NRC staff requested justification for the estimated cost of $7.5 million for implementation of SAMA CW-24, "replace the standby CCW pump with a pump diverse from the other two CCW pumps." This amount seems high for a pump replacement (NRC 2011a). FENOC explained that the expert panel made the following assumptions in developing the cost for this SAMA candidate (FENOC 2011):

- additional safety-related space is needed to provide separation from the existing CCW pumps (approximately $2 million),
- design, procurement, and installation of the pump and associated components and equipment (approximately $4 million),
- modifications to safety-related equipment with seismic evaluation and associated calculation support (approximately $1 million), and
- procedure changes and initial testing and training (approximately $500,000).

Based on the estimated cost for additional safety-related space for the pump, the NRC staff finds FENOC's justification for the cost estimate for SAMA CW-24 reasonable.

The NRC staff requested justification for the estimated cost of $1.75 million for SAMA AC/DC-01, "provide additional DC battery capacity" (NRC 2011a). In response to the RAI, FENOC explained that the expert panel made the following assumptions in developing the cost for this SAMA candidate (FENOC 2011):

- safety-related space for the batteries (approximately $500,000),
- major modifications to equipment (approximately $200,000),

- procedure changes and initial testing and training (approximately $300,000), and
- procurement and installation of batteries and other components and equipment (approximately $600,000).

Based on the estimated cost for additional safety-related space for the batteries, the NRC staff finds FENOC's justification for the cost estimate for SAMA AC/DC-01 reasonable.

The NRC staff reviewed the costs provided in the ER, and in response to NRC staff RAIs, and found them to be reasonable and generally consistent with estimates provided in support of other plants' analyses. The NRC staff concludes that the cost estimates provided by FENOC are sufficient and appropriate for use in the SAMA evaluation.

F.6 Cost-Benefit Comparison

FENOC's cost-benefit analysis and the NRC staff's review are described in the following sections.

F.6.1 FENOC's Evaluation

The methodology used by FENOC was based primarily on NRC's guidance for performing cost-benefit analysis (i.e., NUREG/BR-0184, *Regulatory Analysis Technical Evaluation Handbook* (NRC 1997a)). The guidance involves determining the net value for each SAMA according to the following formula:

Net Value = (APE + AOC + AOE + AOSC) – COE where the following is true:
APE = present value of averted public exposure ($)
AOC = present value of averted offsite property damage costs ($)
AOE = present value of averted occupational exposure costs ($)
AOSC = present value of averted onsite costs ($)
COE = cost of enhancement ($)

If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the benefit associated with the SAMA and it is not considered cost-beneficial. FENOC's derivation of each of the associated costs is summarized below.

NUREG/BR-0058 has been revised to reflect the agency's policy on discount rates. Revision 4 of NUREG/BR-0058 states that two sets of estimates should be developed, one at 3 percent and one at 7 percent (NRC 2004). FENOC provided a base set of results using the 7 percent discount rate and a sensitivity study using the 3 percent discount rate (FENOC 2010, 2012a).

Averted Public Exposure Costs. The APE costs were calculated using the following formula:

APE = Annual reduction in public exposure (Δperson-rem/year)
x monetary equivalent of unit dose ($2,000 per person-rem)
x present value conversion factor (12.27 based on a 28-year period with a 7-percent discount rate)

As stated in NUREG/BR-0184 (NRC 1997a), the monetary value of the public health risk after discounting does not represent the expected reduction in public health risk due to a single accident. Rather, it is the present value of a stream of potential losses extending over the remaining lifetime (in this case, the renewal period) of the facility. FENOC based its calculations

on a 28-year period, which is the summation of the 20-year license renewal period and the 8-year period remaining in the current plant license, which is conservative. For the purposes of initial screening, which assumes elimination of all severe accidents caused by internal events, FENOC calculated, in response to an NRC staff RAI, an APE of approximately $52,000 for the 20-year license renewal period and the 8 years of remaining life in the current plant license (FENOC 2012a).

Averted Offsite Property Damage Costs. The AOCs were calculated using the following formula:

AOC = Annual CDF reduction
x offsite economic costs associated with a severe accident (on a per-event basis)
x present value conversion factor

This term represents the sum of the frequency-weighted offsite economic costs for each release category, as obtained for the Level 3 risk analysis. For the purposes of initial screening, which assumes elimination of all severe accidents caused by internal events, FENOC calculated, in response to an NRC staff RAI, an annual offsite economic cost of about $3,590 based on the Level 3 risk analysis (FENOC 2012a). This results in a discounted value of approximately $44,000 for the 20-year license renewal period and the 8 years of remaining life in the current plant license (FENOC 2012a).

Averted Occupational Exposure Costs. The AOE costs were calculated using the following formula:

AOE = Annual CDF reduction
x occupational exposure per core damage event
x monetary equivalent of unit dose
x present value conversion factor

FENOC derived the values for AOE from information provided in Section 5.7.3 of the *Regulatory Analysis Handbook* (NRC 1997a). Best estimate values provided for immediate occupational dose (3,300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated using the equations provided in the handbook in conjunction with a monetary equivalent of unit dose of $2,000 per person-rem, a real discount rate of 7 percent, and a time period of 28 years to represent the license renewal period and the remaining plant life in the current license. For the purposes of initial screening, which assumes elimination of all severe accidents caused by internal events, FENOC calculated an AOE of approximately $4,300 for the 20-year license renewal period and the 8 years of remaining life in the current plant license (FENOC 2010).

Averted Onsite Costs. AOSCs include averted cleanup and decontamination costs (ACCs) and averted power replacement costs. Repair and refurbishment costs are considered for recoverable accidents only and not for severe accidents. FENOC derived the values for AOSC based on information provided in Section 5.7.6 of NUREG/BR-0184, the *Regulatory Analysis Handbook* (NRC 1997a).

FENOC divided this cost element into two parts—the onsite cleanup and decontamination cost, also commonly referred to as ACCs, and the replacement power cost (RPC).

ACCs were calculated using the following formula:

ACC = Annual CDF reduction
x present value of cleanup costs per core damage event
x present value conversion factor

The total cost of cleanup and decontamination subsequent to a severe accident is estimated in NUREG/BR-0184 to be $\$1.5 \times 10^9$ (undiscounted). This value was converted to present costs over a 10-year cleanup period and integrated over the term of the proposed license extension and remaining plant life. For the purposes of initial screening, which assumes elimination of all severe accidents caused by internal events, FENOC calculated an ACC of approximately $132,400 for the 20-year license renewal period and the 8 years of remaining life in the current plant license.

Long-term RPCs were calculated using the following formula:

RPC = Annual CDF reduction
x present value of replacement power for a single event
x factor to account for remaining service years for which replacement power is required
x reactor power scaling factor

FENOC based its calculations on the 910 megawatt-electric (MWe) reference plant in NUREG/BR-0184 (NRC 1997a) and did not scale down to the 908 MWe rating for Davis-Besse. Therefore, FENOC did not apply a power scaling factor to determine the RPCs, which are conservative. For the purposes of initial screening, which assumes elimination of all severe accidents caused by internal events, FENOC calculated an RPC of approximately $133,900 and an AOSC of approximately $266,300 for the 20-year license renewal period and the 8 years of remaining life in the current plant license.

Using the above equations, FENOC estimated the total present dollar value equivalent associated with eliminating severe accidents from internal events at Davis-Besse to be about $367,000 (FENOC 2012a). As discussed in Section F.2.2, in response to an NRC staff RAI, FENOC used a multiplier of 5.6 to account for external events, which increases the value to $2.05 million and represents the dollar value associated with eliminating all internal and external event severe accident risk at Davis-Besse, also referred to as the modified maximum averted cost risk (MMACR).

FENOC's Results. If the implementation costs for a candidate SAMA exceeded the calculated benefit, the SAMA was considered not to be cost-beneficial. In the revised baseline analysis contained in the responses to an NRC staff RAI (FENOC 2011) and in the 2012 SAMA supplement (FENOC 2012a), using a 7 percent discount rate, FENOC identified one potentially cost-beneficial SAMA. Based on the results of the revised sensitivity analysis using a 3 percent discount rate, FENOC did not identify any additional potentially cost-beneficial SAMAs. FENOC also provided a revised uncertainty analysis using the multiplier of 7.0 to account for external events benefits, which resulted in no additional potentially cost-beneficial SAMAs.

The potentially cost-beneficial SAMA for Davis-Besse is SAMA AC/DC-03, "add a portable, diesel-driven battery charger to existing DC system." This potentially cost-beneficial SAMA, and FENOC's plans for further evaluation of this SAMA, is discussed in more detail in Section F.6.2.

F.6.2 Review of FENOC's Cost-Benefit Evaluation

The cost-benefit analysis performed by FENOC was based primarily on NUREG/BR-0184 (NRC 1997a) and discount rate guidelines in NUREG/BR-0058 (NRC 2004), and it was executed consistent with this guidance.

SAMAs identified primarily on the basis of the internal events analysis could also provide benefits in certain external events. FENOC accounted for the potential risk reduction benefits associated with external events by applying a multiplier to the estimated benefits for internal events. In the analysis reported in the ER, FENOC multiplied the estimated benefits for internal events by a factor of 4.0 incorporating an external events multiplier of 3.0 to account for external events (based on the assumption that fire, seismic and other external events each contribute a benefit equivalent to that from internal events). As discussed in Section F.2.2, the NRC staff noted in an RAI that the external events multiplier should be 3.6 (based on a fire CDF of 2.9×10^{-5} per year, a seismic CDF of 6.7×10^{-6} per year, a negligible contribution from HFO events, and an internal events CDF of 9.8×10^{-6} per year). The NRC staff asked FENOC to assess the impact on the SAMA evaluation of using the higher multiplier (NRC 2011a). In response to the RAI, FENOC provided a revised baseline evaluation by applying an external events multiplier of 4.6 resulting in a total multiplier of 5.6 (based on a fire CDF of 2.9×10^{-5} per year, a seismic CDF of 6.7×10^{-6} per year, an HFO CDF of 1.0×10^{-5} per year, and an internal events CDF of 1.0×10^{-5} per year) to the estimated SAMA benefits in internal events to account for potential SAMA benefits in both internal and external events (FENOC 2011). The results of this revised evaluation, incorporating the revised SAMA analysis provided in the 2012 SAMA supplement, are provided in Table F-6 (FENOC 2012a). As a result of the revised baseline analysis (using a multiplier of 5.6 and a 7 percent discount rate), FENOC found one SAMA (SAMA AC/DC-03) to be potentially cost-beneficial.

The NRC staff asked FENOC to provide an assessment of the uncertainty distribution for CDF and an assessment of the impact on the SAMA analysis of using the 95th percentile CDF (NRC 2011a). In response to the RAI, FENOC presented the results of an uncertainty analysis of the internal events CDF for Davis-Besse, which indicates that the 95th percentile value is a factor of 1.45 greater than the mean CDF for Davis-Besse (FENOC 2011). FENOC reexamined both the Phase I and Phase II SAMAs to determine if any would be potentially cost-beneficial if the revised baseline benefits were increased by an additional factor of 1.45 (in addition to the multiplier of 5.6 to account for external events). No additional SAMAs became cost-beneficial as a result of this analysis or the revised analysis provided in the 2012 SAMA supplement (FENOC 2012a).

FENOC provided the cost-benefit results of additional sensitivity analyses in the ER, including the following:

- assuming the cost of repair and refurbishment of damaged plant equipment is 20 percent of the baseline RPC (FENOC 2011),
- using 3 percent and 10 percent discount rates,
- using 14,000 person-rem for short term dose and 30,000 person-rem for long term doses,
- using an onsite cleanup and decontamination cost of $2.0 billion,
- escalating the annual RPC to 2009 dollars by an average annual inflation rate of 2.3 percent (FENOC 2011),

- using a multiplier of 8.0 to account for external events,
- using a higher population evacuation speed of 1.0 mps (NRC 2011b), and
- In addition, FENOC provided in the ER the results of sensitivity analyses of variations in MACCS2 input parameters (as discussed in Section F.2.2).

Revised results for all of these sensitivity cases are provided in Table E.8-1 of the 2012 SAMA supplement to account for the revised external events multiplier discussed above, to account for the correction to the population estimate discussed in Section F.2.2, and to correct the five errors in the ER SAMA analysis discussed in Section F.2.2 (FENOC 2012a). No additional SAMAs became cost-beneficial as a result of these analyses. It is noted that the sensitivity case using a 3 percent discount rate results in the most bounding cost-benefit results for all SAMAs, all sensitivity analyses, and the uncertainty analysis. The results for the 3 percent discount rate sensitivity case are provided in Table F-6.

The NRC staff noted that the higher evacuation speed sensitivity case resulted in a lower population dose, as would be expected, but the net benefit increased by about $2,000 for each SAMA, which would be expected to decrease. The NRC staff asked FENOC to explain this anomalous result (NRC 2011a). In response to an NRC staff RAI, FENOC clarified that this anomalous behavior was due to the difference in the number of significant digits used in the Level 3 PRA analysis and in the cost-benefit evaluation (FENOC 2011). Revised results were provided for this sensitivity case in which a consistent use of significant figures was applied between the Level 3 PRA and cost-benefit analyses, the revised external events multiplier was used, the revised population estimates discussed in Section F.2.2 were used, the scenario was changed to be a reduction in the baseline evacuation speed of 9.6 percent, and the five errors in the ER SAMA analysis discussed in Section F.2.2 were corrected. The revised results for this sensitivity case are provided in Table E.8-1 of the 2012 SAMA supplement (FENOC 2012a). No additional SAMAs became cost-beneficial as a result of this analysis. In addition, the results for this sensitivity case continued to be bounded by the 3 percent discount rate sensitivity case.

As indicated in Section F.3.2, the NRC staff asked the applicant to discuss opportunities for reducing risk by providing automatic functions to risk significant operator actions (NRC 2011a). In response to the RAI, FENOC identified and evaluated the following additional SAMA candidates that address risk-significant operations (FENOC 2011):

- AC/DC-28R, “automatically start and load the SBO diesel generator (DG) on Bus D2 upon loss of power to the bus”—The cost-benefit evaluation of this SAMA candidate is provided in Table F-6 and was determined to not be cost-beneficial in either the revised baseline evaluation or the revised uncertainty and sensitivity analyses.
- OT-08R, “automatically start and load the SBO DG on Bus D2 upon loss of power to the bus in combination with automatically starting the motor-driven feedwater pump (MDFP)”—The cost-benefit evaluation of this SAMA candidate is provided in Table F-6 and was determined to not be cost-beneficial in either the revised baseline evaluation or the revised uncertainty and sensitivity analyses.

As indicated in Section F.3.2, the NRC staff asked the applicant to evaluate potentially lower cost alternatives to the SAMAs considered in the ER (NRC 2011a), as summarized below:

- Automate RCP trip on high motor bearing cooling temperature—In response to the RAI, FENOC provided a cost-benefit evaluation of this SAMA candidate, referred to as SAMA CW-26R (FENOC 2012a). The evaluation of this SAMA is provided in Table F-6

and was determined to not be cost-beneficial in either the revised baseline evaluation or the revised uncertainty and sensitivity analyses.

- Use the DHR system as an alternate suction source for HPI—In response to the RAI, FENOC explained that the Davis-Besse PRA already credits use of the DHR system as a suction source for HPI and that this is effectively already implemented (FENOC 2011). The NRC staff concludes that this alternative has been adequately addressed.

- Automate HPI injection on low pressurizer level (in loss of secondary side heat removal cases where the RCS pressure remains high while the RCS level drops)—In response to the RAI, FENOC explained that this proposed alternative is not viable for implementation at Davis-Besse because of design and system configuration differences between the Davis-Besse plant and other B&W plants (FENOC 2011). Specifically, this proposed improvement is applicable to B&W plants in which the HPI system is also the makeup system, and HPI cooling must be established earlier enough to prevent uncovering of the core due to RCS inventory depletion. For the Davis-Besse design, the HPI system is separate from the makeup system, and the HPI system is not capable of injecting water into the RCS until a specific pressure threshold is reached. In addition, makeup and HPI cooling can be delayed at Davis-Besse because Davis-Besse has two makeup pumps. The NRC staff concludes that this alternative has been adequately addressed.

- Automate refill of the BWST—In response to the RAI, FENOC provided a cost-benefit evaluation of this SAMA candidate, referred to as SAMA CC-22R (FENOC 2012a). The evaluation of this SAMA is provided in Table F-6 and was determined to not be cost-beneficial in either the revised baseline evaluation or the revised uncertainty and sensitivity analyses.

- Automate start of AFW pump in the event the automated EFW system is unavailable—In response to the RAI, FENOC provided a cost-benefit evaluation of this SAMA candidate, referred to as SAMA FW-17R (FENOC 2012a). The evaluation of this SAMA is provided in Table F-6 and was determined to not be cost-beneficial in either the revised baseline evaluation or the revised uncertainty and sensitivity analyses.

- Purchase or manufacture of a “gagging device” that could be used to close a stuck-open steam generator safety valve for an SGTR event prior to core damage. In response to the RAI, FENOC provided a cost-benefit evaluation of this SAMA candidate, referred to as SAMA CB-22R (FENOC 2012a). The evaluation of this SAMA is provided in Table F-6 and was determined to not be cost-beneficial in either the revised baseline evaluation or the revised uncertainty and sensitivity analyses.

As indicated in Section F.3.2, in response to an NRC staff RAI, FENOC provided a revised baseline evaluation for four Phase I SAMAs that were screened by being subsumed into other SAMAs (FENOC 2012a). The four subsumed SAMAs are AC/DC-06, AC/DC-09, AC/DC-20, and CC-08, which FENOC estimated to have implementation costs of $1.75 million, $2.8 million, $700,000, and $1.5 million, respectively. FENOC estimated the baseline benefit of these SAMAs to be the same as the SAMAs into which they were subsumed, namely SAMAs AC/DC-01, AC/DC-14, AC/DC-19, and CC-19, respectively. The revised benefits for these SAMAs are provided in Table F-6, and, in each case, the implementation cost of the subsumed SAMA is much greater than the estimated benefit. FENOC consequently determined the subsumed SAMAs to not be cost-beneficial.

FENOC states in Section E.9 of the ER that the one SAMA (SAMA AC/DC-03) determined to be potentially cost-beneficial in both the baseline analysis and the sensitivity analysis will be

considered for implementation through the normal processes for evaluating possible plant modifications.

The NRC staff concludes that, with the exception of the potentially cost-beneficial SAMA discussed above, the costs of the other SAMAs evaluated would be higher than the associated benefits.

F.7 Conclusions

FENOC initially compiled a list of 167 SAMAs based on a review of the dominant cutsets and most significant basic events from the plant-specific PRA, insights from the plant-specific IPE and IPEEE, Phase II SAMAs from LRAs for other plants, and review of other industry documentation. An initial qualitative screening removed the SAMA candidates:

- The SAMA has design differences or has already been implemented at Davis-Besse.
- The SAMA is not applicable to Davis-Besse.
- The SAMA has estimated implementation costs that would exceed the dollar value associated with eliminating severe accident risk at Davis-Besse.
- The SAMA is related to a non-risk significant system and, therefore, has a very low benefit.
- The SAMA is similar in nature and could be combined with another SAMA candidate.

Based on this screening, 152 SAMAs were eliminated, leaving 15 candidate SAMAs for evaluation as well as 6 additional SAMAs identified in response to NRC staff RAIs.

For the remaining 21 SAMA candidates, more detailed design and cost estimates were developed, as shown in Table F-6. In response to NRC staff RAIs, and in the 2012 SAMA supplement, FENOC provided revised cost-benefit analyses that showed that one of the SAMA candidates was potentially cost-beneficial in the revised baseline analysis (SAMA AC/DC-03). FENOC also performed additional analyses to evaluate the impact of parameter choices and uncertainties on the results of the SAMA assessment. As a result, no additional SAMAs were determined to be potentially cost-beneficial.

The NRC staff reviewed the FENOC analysis and concludes that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs support the general conclusion that the SAMA evaluations performed by FENOC are reasonable and sufficient for the license renewal submittal. Although the treatment of SAMAs for external events was somewhat limited, the likelihood of there being cost-beneficial enhancements in this area was minimized by improvements that have been realized as a result of the IPEEE process and inclusion of a multiplier to account for external events.

The NRC staff concurs with FENOC's identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of the identified, potentially cost-beneficial SAMA. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further evaluation of this SAMA by FENOC is warranted. However, this SAMA does not relate to adequately managing the effects of aging during the period of extended operation. Therefore, it is not required to be implemented as part of license renewal pursuant to Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54).

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11. ABSTRACT (200 words or less)

This draft supplemental environmental impact statement has been prepared in response to an application submitted by FirstEnergy Nuclear Operating Company (FENOC) to renew the operating license for the Davis-Besse Nuclear Power Station, Unit No. 1, for an additional 20 years.

This draft supplemental environmental impact statement includes the preliminary analysis that evaluates the environmental impacts of the proposed action and alternatives to the proposed action. Alternatives considered include natural gas combined-cycle (NGCC); combination alternative (wind, solar, NGCC and compressed air energy storage; coal-fired power; and not renewing the license (the no action alternative).

The U.S. Nuclear Regulatory Commission's preliminary recommendation is that the adverse environmental impacts of license renewal for Davis-Besse are not great enough to deny the option of license renewal for energy planning decision makers. This recommendation is based on the following: the analysis and findings in NUREG 1437, Volumes 1 and 2, Generic Environmental Impact Statement for License Renewal of Nuclear Plants; the environmental report submitted by FENOC; consultation with Federal, state, and local agencies; the NRC's environmental review; and consideration of public comments received during the scoping process.

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